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of

The New York Botanical Garden

Volume IV, 1905-1907

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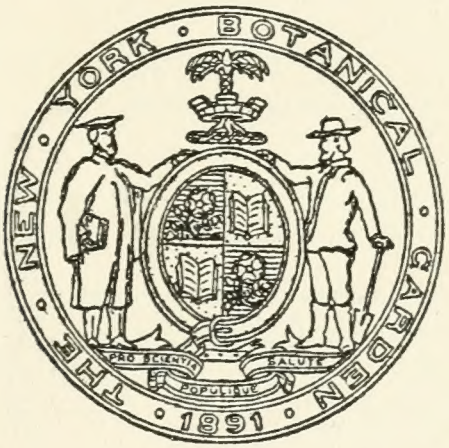
BULLETIN

OF

The New York Botanical Garden



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The New York Botanical Garden

Vol. 4. No. 12.

REPORT OF THE SECRETARY AND DIRECTOR-IN-CHIEF FOR THE YEAR 1904

(*Submitted and ordered printed January 9, 1905.*)

To the Board of Managers of the New York Botanical Garden.

Gentlemen: I have the honor to submit herewith my report as Secretary and Director-in-Chief for the year ending January 9, 1905.

The development of the Garden has gone forward continuously in all departments during the year just ended. Construction work, in accordance with the general plan adopted in 1896, has been actively prosecuted, and the value of this original study of the project has continued to be apparent. Noteworthy additions have been made by gift, purchase, and exchange, and through explorations, to the collections of living plants, the museums, library, and herbarium. The number of visitors has materially increased, and we have had a larger number of special students and investigators making use of our equipment than ever before. Our permanent funds have increased about $2,500, and the sums borrowed from them for development during the early period of construction operations have now been nearly repaid. The annual and life members of the Garden now number 1,108, an increase during the year of 14. Gifts of money by many friends of the institution have enabled us to secure important additions to the collections, which our ordinary income would not have

permitted; the large number of 360 different persons have contributed either money or material, exclusive of annual membership dues. The city has enabled work on roads, paths, bridges, and grading to be continued uninterruptedly, by an additional appropriation of $75,000, which became available for expenditure in the late summer, but it has not increased the allowance for general maintenance of grounds, buildings and collections, which stands at $70,000 for 1905, the same as for 1904, and is too little for the proper upkeep of the Garden in its present state of development.

Construction of Roads and Paths

Work on the main park driveway west and north of the museum building has been prosecuted at intervals and is now so far advanced that this road may be completed and opened for use early in the spring, there only remaining its final surfacing and rolling to be done; this will complete all the Telford McAdam roadway planned west of the Bronx River, except the connections with the two bridges under construction across the railway at the Mosholu Parkway and Woodlawn Road, the earth filling and retaining walls for which have not yet been made, though part of the filling needed at the Mosholu Parkway approach has been put in place and the dumping there is being continued during the winter.

On the east side of the Bronx River a considerable part of the grading required for the driveways was done in 1903, and most of the filling needed for the easterly approach to the long bridge across the valley of the Bronx has been made during the last few months; this work is going on during the winter. The driveway approach to the public conservatories, which had been considerably cut up by the hauling of heavy building material for the cut stone steps of the conservatory terraces and for the large tanks for water plants in the court of the conservatories, was resurfaced during the autumn. The service road to the power house was also completed.

Path building has gone forward on a large scale. The

completion of the steps and tanks at the conservatories permitted the building of the paths planned on the conservatory terrace and of those leading to it, including the resurfacing of those previously built. Parts of the path system between the valley of the herbaceous garden and the hemlock grove were completed, and the Telford foundations of other portions were laid. Path approaches were built to the public comfort station at the elevated railroad station, and to the power house. The path east of and paralleling the driveway east of the museum building was completed as far north as practicable before the building of the lake bridge. The Telford foundations for the path which will connect the Mosholu Parkway and Woodlawn Road approaches was mostly laid, as was also that for much of the path system on the fruticetum plain to connect these approaches and the path system south of the museum building with the long bridge; also a part of that on the north meadows to connect the upper bridge with the other bridges, buildings and entrances. The stone for the foundations of all these driveways and paths has been furnished by our own grading operations and more is being excavated during the winter from a quarry behind the museum building where necessary grading is going forward.

Bridges

The steel and stone upper bridge across the Bronx River at the northern end of the Garden near the Newell Avenue entrance, built under a contract of the Department of Parks, was satisfactorily completed in the spring; during the summer, after the earth filling at its ends had well settled, the Telford foundation for the driveway was laid across it and the curbstones set in place.

Work on the rubble stone five-arched long bridge, across the valley of the Bronx River north of the hemlock grove, has been prosecuted throughout the season under a contract of the Department of Parks, and all but the middle arch has been completed; this work should be finished by June or July; all the rubble stone used in this structure has been fur-

nished by grading operations northeast of the public conservatories, the rock being excavated by the contractor.

The contract for the building of the one-arched stone bridge to carry the main driveway across the valley of the lakes northeast of the museum building, was awarded by the Commissioners of Parks on January 5, 1905, to Jos. Gallo; the expense of this work is about $37,000, and it should be completed within a year.

Work on the abutment and retaining walls of the bridge at the Mosholu Parkway entrance has gone forward during the season under a Park Department contract, but lack of appropriation has compelled the Department to defer the completion of this structure; the work is far enough advanced, however, to permit some of the earth filling to be made during the winter.

The bridge across the railway at Woodlawn Road has been completed during the season, but no appropriation has as yet been made to enable the Department of Parks to construct the approaches to it.

Grading

Grading operations immediately around the public conservatories were continued during the early part of the season, and essentially completed in September; this work included the completion of the terrace on which these buildings stand, and the topsoiling and sowing of the grounds adjacent, to the south and east. The knoll southeast of these buildings was completely topsoiled and sown, and thus prepared for the planting of conifers as contemplated by the general plan.

Small areas near the Southern Boulevard entrance, between the traffic road and paths, were graded, topsoiled, and sodded or sown; some work still remains to be done at this entrance, including the finishing of the two rocky knolls, at each side of the traffic road; this has been deferred, however, awaiting the rebuilding of the Southern Boulevard now in progress by the Highways Department of the borough.

The surplus rock of the excavations just north of the public conservatories made necessary to form the finished surfaces

there, has mostly been used in the construction of the long bridge by the contractor, Mr. Leahy, who has excavated and carted it; some has gone into the Telford foundations of the driveways. A small amount still remains to be excavated, and as soon as this is accomplished in the spring, it is proposed to do the final work in grading at this point, and to topsoil and sow the area still denuded.

Portions of the grounds south of the museum building along the paths leading from it to the herbaceous garden and the public conservatories were topsoiled and sown or sodded.

An area at the extreme southwestern corner of the Garden, at the elevated railway station, was regulated, graded and sown, as were also the immediate surroundings of the public comfort stations and the power house.

The path-building work east of the valley of the herbaceous garden, and east of the museum building, already referred to, necessitated considerable grading and sodding.

Much of the topsoil and sod required to form the finished surfaces in these grading operations has come from the stripping of land within the lines of roads and paths, either moved directly into place, or taken from stacks where previously accumulated, but several hundred loads were obtained, for the digging and hauling, from contractors who were grading grounds during the spring and summer for streets and building sites along the Mosholu Parkway west of the Garden. No sod nor topsoil has as yet been purchased.

Much grading has been done along the driveways and paths under construction north and northeast of the museum building, including a heavy earth filling at the north end of the upper lake, where work is still going on, the material being brought from the rear of the museum building.

At the Woodlawn Avenue Bridge, preparation for the filling needed in building its approaches has been made, by taking out the topsoil and distributing it to areas between the main driveway and paths where needed.

In 1896, at the time the temporary construction railroad for the Jerome Park Reservoir was build through the grounds,

a dirt embankment several hundred feet long was made by the contractor through a valley from the eastern end of the trestle nearly to the Garden barn; the abandonment of this railway by the contractor during the past summer has given opportunity for using this embankment as filling for the driveways at the east end of the long bridge, where it is now being hauled; its removal will restore this valley to its original form. The abandonment of this railway has also made it possible to regulate and grade the grounds just west of the barn.

Drainage and Sewerage

The laying of the drain from the cellar of the museum building to the upper lake, commenced late in 1903, was completed in the spring; this work necessitated cutting through rock to a depth of about 14 feet for a considerable distance, and putting in a 10-inch earthenware pipe, which now completely controls the drainage of the building and will ultimately come into use for the drainage of the court. The sewer connection east of the Bronx River, on which work was commenced last winter, was also completed in the spring, providing satisfactory sewerage of the barn and also making it possible to build a public comfort station on the east side of the grounds, where the need of one is beginning to be apparent.

A sewer connecting the public comfort station at the elevated railway approach with the large drain at the power house was laid early in the season.

The 12-inch land drain east of the Bronx River, laid several years ago, was continued to the east end of the long bridge, outflowing into the river, before beginning the earth filling required for the approach at this point.

Catch-basins and short drain-pipe connections from them to drains already laid, have been built at a number of places. Some drain-pipes were laid, and others relaid at the new propagating greenhouse at the nurseries.

All these sewer- and drain-pipes have been carefully plotted on our location plan, so that their position may be known in

the future. Further details of all this work will be found in the report of the Superintendent of Grounds, hereto appended.

Water Supply

No extension of the water-pipe system has been made during the year, but it is intended to extend the main 6-inch line along the driveways north and east of the museum building as indicated on the general plan, during next season.

Buildings

Detailed accounts of the operations on buildings will be found in the report of the Assistant Director hereto appended.

Construction work during the year included the completion of the range of propagating houses, by the building of an additional greenhouse, and completing the original plan, which was, however, modified by including a large and commodious cellar under the new structure. This work was finished and the building put into operation during the summer.

Two completely equipped public comfort stations were built at the approach to the elevated railway station, under the contract awarded toward the end of 1903 to Springsted and Adamson; these were completed and opened to the public on July 1.

At the power house, an overhead structure for delivering ashes into a concrete ashpit just west of that building was completed late in the year; this avoids the heavy work of wheeling the ashes up the runways.

In order to supply additional stalls for horses, a modification was made of the interior structure of the stable, during the autumn, which has proven to be a great convenience.

A contract for furnishing and setting the bronze fountain in front of the museum building, from the studies and moulds of Mr. Carl E. Tefft, the sculptor, was awarded to the Roman Bronze Co. of Greenpoint, N. Y., by the Commissioners of Parks, December 29, 1904. It is expected that this work may be completed in about four months.

Plants and Planting

The report of the Head Gardener, hereto appended, shows that 12,053 species of plants were represented in the collections during the year, an increase of 451 species over the record of 1903. A large number of specimens have been replaced by better ones of the same species, and the number of individual plants cultivated in the conservatories has been somewhat reduced by the elimination of imperfect specimens or of duplicates, many of which have been sent to other institutions in exchange. The increased areas taken into cultivation, and the largely increased areas of lawns and finished banks, necessitate greater expenditure in maintenance.

The capacity of the public conservatories for the housing of plants has been nearly reached, and I now recommend that plans be prepared for the construction of another range of greenhouses, as contemplated by the original plans and studies made in 1896 and 1897. I referred to this approaching need in my annual report for 1902 (Bulletin N. Y. Bot. Gard. 2: 412). As there stated, the cost of this proposed structure should be very much less than the range already built, on account of much less height being required. With the intention of building an additional range of glass, the present range was designed essentially for tropical plants of large or of considerable size, deferring the construction of smaller houses to the future. This proposed new structure should have a floor area at least as great as the present range, and even with this development, we would not have as much glass as has been found necessary at the Royal Gardens at Kew, England, where a very much milder climate permits the cultivation of many more species out of doors.

It will be recalled that the modification of our original studies, made by the Park Commissioners in 1897, caused the abandonment of the first suggested site of the present glass building and their construction where they now stand, and the position first selected for them has proved to be very desirable for parts of the collection of conifers and for the morphological garden. It seems desirable from the present de-

velopment of the Garden that this proposed new greenhouse should be built east of the Bronx River, in order to establish it at a considerable distance from the present conservatories and from the museum building, and to provide a prominent feature on the east side of the ground, which will probably soon become easily accessible from the south by the extension of the rapid transit system.

It will be desirable to design this proposed new structure in such a way that it may be built in sections, necessitating no very heavy expenditure during any one year, and to include in it provision for space for considerable floral display.

I therefore recommend that authority be given me to consult with the Commissioner of Parks relative to a site for this structure, and to have plans prepared for it, to be submitted to you and to the Commissioner of Parks.

A detailed account of the gardening operations will be found in the report of the Head Gardener, hereto appended.

Library

The report of the Librarian, hereto appended, shows that the collections of books was increased during the year by 1,166 bound volumes, and by a large number of pamphlets ; of these bound volumes 694, or considerably more than one half, were presented to the Garden. Contributions of money used for the purchase of books and credited to the Special Book Fund have been made as follows :

Andrew Carnegie	$300.00
D. O. Mills	100.00
Mortimer L. Schiff	100.00
Samuel Sloan	100.00
Isaac N. Seligman	100.00
Geo. S. Bowdoin	100.00
Lowell M. Palmer	100.00
Robt. M. Thompson	100.00
Mrs. George Whitfield Collord	100.00
George Foster Peabody	100.00
Wm. D. Sloane	100.00
Geo. M. Olcott	50.00

W. B. Dickerman	50.00
J. E. Parsons	50.00
Miss Grace H. Dodge	25.00
S. S. Palmer	25.00
Miss Eva V. C. Morris	25.00
Miss Martha Potter	15.00
Total	$1,540.00

Exchanges of publications with other institutions have been largely extended, so that the number of societies, gardens, museums and other institutions now sending us their publications is about 455.

The building up of our library has, on the whole, gone forward satisfactorily, through the liberal aid which has been given by many friends of the Garden. In order to make the collection as complete as that of the larger botanical libraries of the Old World, it will be necessary to expend considerable more money, however, and to so arrange our finances as to always be able to secure a rare work when it is offered. Some of the older literature is of course practically unattainable, and the amount that is becoming beyond our reach is increasing from year to year. We should certainly aim to make the library as complete as possible in pure botany, and in its related sciences of horticulture, agriculture, forestry, and such portions of general biology as apply to plants, and I believe that no greater service could be rendered to these subjects in America, than by some provision by means of which our library should be perfected.

The library of the British Museum of Natural History in London is probably the most complete collection existing; the method chosen by the trustees of that institution some years ago, was to select a responsible firm of bookdealers, and give them authority to secure any work not already obtained, payments for such accessions being made at the convenience of the Museum. This firm has twice offered to act for us in the same way, but I have never seen my way clear to bring this matter to your attention, on account of the very considerable sum which would have to be set aside to meet

the necessary expense, nor is it practicable now for me to recommend this course with our present income.

It will soon be necessary for us to consider increasing the shelf capacity of the library, as the shelves already provided will not accommodate more than about 2,000 additional books. The architect's plan for increasing the shelving has always been to construct a set of bookcases above those already built in the stackroom, by means of a steel frame, thus bringing the collection on two levels, and floor beams of sufficient strength to permit this were used when the building was constructed.

Museums and Herbarium

The incorporation of additional specimens into the collection has gone forward actively, and the accumulated quantity of specimens hitherto stored has for the most part been installed, or distributed to other institutions, the total additions to the permanent collections amounting to 102,716, of which 60,552 were obtained during the year, and 42,164 were previously stored. The museum cases are ample to receive the natural growth of the collection for some time, but we now need additional herbarium cases, which it is hoped may be obtained during the year. The growth of the herbarium has been very rapid, owing to the great number of specimens that have been given to the Garden, and the several private herbaria which have been purchased, so that the nucleus of a collection of dried plants comparable in size and importance to the larger ones of the Old World has now been formed. Dr. Rusby informed me when he returned from Europe in the autumn, that he thinks the size of our herbarium is now between one fourth and one third that of the Royal Gardens at Kew. The very rapidity of our accumulation of specimens has prevented their critical study in many instances, and it is proposed, now that the specimens secured have nearly all been mounted, to devote special attention during the next year to their study and arrangement, looking forward to a much less rapid accumulation of material in the in the immediate future.

The report of the Curator of the Museums and Herbarium, hereto appended, describes in detail all the work of this department.

Laboratories

The uses of the laboratories and the work of students and of visiting investigators who have been given facilities for study, are described in the appended report of the Assistant Director.

Lectures

The system of public lectures delivered in the lecture hall of the museum building on Saturday afternoons during the spring and autumn, has been continued with satisfactory results, the audiences numbering from fifty to somewhat over five hundred persons. It is desirable to increase the number of lectures as rapidly as the means therefor can be obtained; the Saturday afternoon series might profitably be extended to every Saturday in the year, and other lectures, designed with special reference to the needs of teachers and their pupils, might be given with advantage.

Exploration

The policy of sending members of the staff, or special agents, to various parts of the world for the purpose of collecting living plants, seeds and specimens, has been continued, with great advantage to the collections, and the addition of a very large amount of important information to the sciences of botany and horticulture. During the year this part of our work has been accomplished by means of appropriations from four general fund and by the following contributions of money credited to our special exploration fund:

W. Bayard Cutting	$320.45
J. Pierpont Morgan	300.00
D. O. Mills	200.00
Mrs. Matilda W. Bruce	200.00
James B. Ford	150.00
Geo. W. Perkins	150.00
James Speyer	150.00

John Innes Kane	150.00
Charles Lanier	150.00
H. C. von Post	100.00
R. W. de Forest	100.00
H. L. Terrell	100.00
Samuel N. Hoyt	100.00
Louis Marshall	100.00
F. N. Warburg	100.00
Grant B. Schley	100.00
James A. Scrymser	100.00
Louis C. Tiffany	100.00
Samuel Sloan	50.00
Zenas Crane	50.00
Edgar L. Marston	50.00
Geo. B. Hopkins	50.00
Miss Elizabeth Billings	50.00
A. F. Estabrook	50.00
A. G. Agnew	35.00
Samuel P. Avery, Jr	25.00
Henry F. Walker	25.00
Wm. Church Osborn	25.00
John Crosby Brown	25.00
Bernard G. Amend	25.00
Wm. Stratford	10.00
Mrs. Lawson Valentine	10.00
Mrs. James H. Aldrich	10.00
C. Temple Emmet	10.00
James Douglas	10.00
Miss Jennie R. Cathcart	3.00
Total	$3,183.45

The results of the several explorations have been duly recorded in our JOURNAL, and only a summary of them is necessary here.

Work in the Philippine Islands, commenced late in 1903, has been continued during the year by Mr. R. S. Williams, a special agent of the Garden, in coöperation with the resident botanists of the Insular Government. Three large consignments of specimens and seeds have been received from

him, and I have put their study and arrangement in the hands of Mr. C. B. Robinson, who has been serving for part of the time as a resident research scholar. In addition to organizing the material sent in by Mr. Williams, and arranging it together with other collections from the Philippines, Mr. Robinson has entered upon the work of compiling a catalogue of the Philippine flora, based in part on the specimens and in part on the literature of the subject.

Dr. D. T. MacDougal, Assistant Director, spent parts of January and February in the southern part of the valley of the Colorado River, and on the northeastern coast of Lower California, securing a considerable number of the very interesting plants of this little known region, a large number of photographs and some herbarium specimens.

I explored subtropical Florida, accompanied by Mrs. Britton and by Dr. Marshall A. Howe, Assistant Curator, during parts of March and April, in continuation of work previously done in that region by Dr. John K. Small, Curator of the Museums, and Mr. Geo. V. Nash, Head Gardener, and Dr. Howe and I visited the island of New Providence, Bahamas, in April, with Dr. C. F. Millspaugh, Curator of Botany in the Field Columbian Museum; my stay on New Providence was only for two days at this time, but Dr. Howe and Dr. Millspaugh conducted an exploration by means of a sloop from New Providence northwestwardly to the western Bahamian cays, and thence to Miami, Florida. The results of this Bahamian exploration showed that our knowledge of this archipelago was still very incomplete, and in my report on this work I recommended that we organize a detailed botanical survey of the Bahamas. It became possible for me to follow up this recommendation by visiting New Providence again during parts of August and September, where I was assisted by Mrs. Britton, and by Mr. L. J. K. Brace, a resident botanist; a large collection was made at this time which has since been somewhat critically studied, and proves to contain many species of interest and of novelty. The Bahamian exploration was further continued by Mr. Nash,

Head Gardener, assisted by Mr. Norman Taylor, a garden aid, who proceeded to Inagua, one of the southern islands of the archipelago, in October, being absent about five weeks, and securing a collection which contains more of interest and of novelty than was thought possible; Mr. Nash's report on this work will be published in the January issue of the JOURNAL. I have again continued this investigation by sending Mr. Brace in December to Abaco, the northeastern island of the group; he is under instructions to spend about a month there, and return to Nassau about the middle of January. I desire to take further part in this field work by making an examination of the Great Bahama Island, the most northwestern island of the Bahamas, and devote the month of February to this work; this island can be reached by a vessel from Nassau, and inasmuch as Dr. Millspaugh can accompany me at this time, the expense of this boat would be much less than if we went alone.

Further work in subtropical Florida was accomplished in May by Dr. Small, assisted by Mr. Percy Wilson, and Dr. Small again visited the same region in November. Each visit to this peculiar region discloses the existence there of species either new to science or not hitherto known except in the West Indies, and, notwithstanding the number of trips that we have made there, it is probable that the novelties are not yet exhausted.

Investigations

Botanical and horticultural studies upon the collections have been prosecuted by all members of the staff and assistants, and also by forty-five students, and by many visiting investigators from other institutions. Practically the entire time of members of the staff not required for preparation and installation of the collections is given to study, and important and substantial contributions to knowledge have been made, some of which have attracted international attention. Accounts of the research work accomplished will be found in the reports of the several officers, and a statement of the work

of students in the report of the Assistant Director, hereto appended. The provision for members of the staff to visit other institutions has again proved most valuable, the most noteworthy event of the past year being a study by Dr. Marshall A. Howe, Assistant Curator, of the collections of algae in European museums, an account of which has already been published by him in our JOURNAL.

Research Scholarships

Research Scholarships have been granted to three persons for a total of ten months, in accordance with the action of the Board of Managers at the annual meeting in January, 1903.

Dr. J. C. Arthur, Botanist to the Agricultural Experiment Station and Professor of Plant Physiology and Pathology, Purdue University, held a scholarship for a month, during which time he made some critical studies of the Uredinae (rusts) for the purpose of completing his investigations of the polymorphism of these interesting parasites which spend portions of their life-cycle on different species of plants. Dr. Arthur's studies are also to be used in the description of the group in the North American Flora. He has contributed many specimens of these fungi to our collections.

Dr. J. E. Kirkwood, Assistant Professor of Botany in Syracuse University, held a research scholarship for two months, during which period some further studies on the embryology of the Cucurbitaceae were pushed to an advanced stage of completion and some bibliographical work on the subject was accomplished.

Mr. C. B. Robinson, who held a scholarship for one period of four months and a second period of three months, engaged in the study, installation and arrangement of the collections from the Philippines, and in the preparation of a monograph of the stone-worts (Characeae), made possible by the great collection of these plants presented to the Garden some years ago by Dr. T. F. Allen.

Preservation of Native Plants

The income of the fund of $3,000 established by the Misses Caroline and Olivia E. Phelps Stokes in 1901 for the protection of wild flowers, has been expended in part in the printing and distribution of essays upon the subject, which have received wide attention and favorable comment, and in part in defraying the expenses of the series of lectures, delivered in eight cities by Dr. C. E. Waters, Treasurer of the Wild Flower Preservation Society. It is believed that the existence of this fund and the expenditure of its income are having a salutary effect, in calling attention to the many reasons why natural scenery and native plants should be preserved.

Administrative

The action of the Board of Managers in promoting Dr. D. T. MacDougal, First Assistant, to the position of Assistant Director, which took effect on June 1, has been of very great advantage in the administration of the institution. I referred to him all details of maintenance, and have since then been able to give more time to the work of construction and to the oversight of the installation of the collections. This division of administrative duties is a natural one, and has operated satisfactorily. I have also been able to give time to the study of the West Indian collections, to the preparation of manuscript for the North American Flora, and to personally directing the studies of others.

Reports Appended

I submit also reports by the Assistant Director, the Curator of the Museums and Herbarium, the Curator of the Economic Collections, the Librarian, the Head Gardener, the Superintendent of Buildings and Grounds, and a schedule of expenditures under appropriations by the Board of Managers.

Respectfully submitted,

N. L. Britton,

Director-in-Chief.

REPORT OF THE ASSISTANT DIRECTOR

Dr. N. L. Britton, Director-in-Chief,

Sir: I have the the honor to present the following report for the year ending January 1, 1905.

In accordance with the appointment conveyed by the Director-in-Chief, the duties of the Assistant Director, entailing a supervision of the maintenance of the Garden, were assumed on June 1, 1904.

Roads, Paths and Grounds

The roads and paths of the Garden have been kept in order by employees of the Department of Parks in accordance with the act of organization of the Garden, two men being employed in restoring the surfaces of the walks and driveways: a force which is hardly adequate to the task, however, and it will be necessary that an addition to this detail be made by the Department if the driveways are to be kept in good average condition. In September and October the Department was able to furnish screenings, which were applied to the repair of the surface of the roads and paths in various parts of the grounds.

The lawns, terraces, plantations and borders have been mowed, rolled, cultivated and kept in order by laborers and gardeners, as detailed in the reports of the Head Gardener and Superintendent. The area under high cultivation having been increased by large extensions in various parts of the Garden, the care of the grounds now demands an increased force of laborers and gardeners.

The usual number of trees in the woodlands have reached maturity, or have been uprooted by the wind and have been removed. The precautions found necessary for the protection of the Hemlock Grove have been observed, with the result that this forest may be reported to be in a very healthy condition. It may be necessary to take steps for the prevention of too much disturbance of the humus, which is an ex-

tremely important factor for a forest of this character. This may be done by directing visitors along indicated paths.

The constantly increasing number of visitors to the Garden and the completion of extensions to the roads, paths and collections, has made necessary some additions to the details for guard duty with the result that the total number on duty on holidays and other special occasions now numbers 26. In addition to this unavoidable increase, it has been necessary to provide attendants for the public comfort stations near the entrance to the terminal station of the Manhattan Elevated Railway, and to appoint two special guards by whom the grounds were patrolled from 7 A. M. until 8 P. M. daily during the summer season. Some service has been rendered by the patrolmen attached to the 41st precinct, but no special detail has been made for any part of the Garden except upon certain occasions. It is highly desirable that some favorable action looking toward the more complete protection of the Garden be secured from the Commissioner of Police.

It is to be noted that the amount of damage to the collections has been very small, and it is gratifying to be able to report the growth of a healthy sentiment on the part of the public as to the preservation of the collections and of the natural features of the grounds. On several occasions, intelligent visitors have been known to prevent thoughtless persons from injuring lawns, wild plants, and objects on exhibition. The existence of such a sentiment has done much to supplement the inadequate guard service we are able to provide.

On the other hand, the deposition of newspapers and rubbish of various kinds in the grounds has increased to such an extent that one man is no longer able to clear up the litter resulting from this carelessness. It is necessary that vigorous measures be taken to abate this growing nuisance.

The cabs and hacks which wait for passengers at the entrances continue to be a source of annoyance to visitors by persistent soliciting, and of damage to the roadways by the disregard of the regulations governing licensed vehicles.

It is to be seen from the foregoing that a material increase

in the number of employees of the Park Department for the care of the roads and paths, and of the laborers, gardeners, guards, and police for the care of the plantations, the preservation of the natural features of the Garden and the regulation of visitors and vehicles, is necessary.

The Museum

A number of important repairs and alterations have been made in the museum, which improved the condition of the building and made possible an increase in the efficiency of several phases of the work of the Garden. The completion of the drain leading out from the subcellar of the lecture hall has resulted in a much drier condition of the entire basement of the building, and in an improvement of the sanitary conditions in general. A number of sinks have been moved from the uppermost floor to various points where needed, and the large aquarium in the physiological laboratory has been removed to the experimental greenhouse in order to facilitate some special investigations. Two masons were employed in repointing the joints in the cornices and walls, in October, November and December, by which several bad leaks were stopped. This work was also extended to the balustrades, steps, and walls of the approach.

No serious repairs having been made to the surfaces of the walls in the interior of the building since its erection, the painters were employed almost constantly during September, October and November, in cleaning the surfaces and painting the same with a mixture of white lead and zinc. The phanerogamic herbarium, the cryptogamic herbarium, the hallways and rooms east of the Director's office have been treated in this manner, as well as the Director's administrative office on the first floor, and it is proposed to extend the method over the entire building. The upper part of the unused elevator shaft has been converted into a storeroom for the janitors. The photographic darkroom has been provided with large panels of orange and ruby glass in the door and overhead, which increases its usefulness. A

large shallow sink of especial construction has been provided in the physiological laboratory for use in investigations upon the influence of gas upon plants.

Four oak vertical files have been added to the equipment of the library for the purpose of containing the large series of illustrations at present in the cryptogamic herbarium, and a single vertical filing case has been placed in the office of the Assistant Director for the purpose of preserving scientific correspondence. In addition a special file has been provided for the paid vouchers of the institution which are stored in the publication room.

The flagstaff over the main entrance, which was shattered by a stroke of lightning in July, 1903, has been repaired and put in good order by splicing the uninjured basal portion of the shaft. By a recent regulation, the colors are hoisted at 10 A. M. and lowered at 4.30 or 5 P. M., being displayed during the period in which the museum is open to visitors.

It has been found necessary to detail two janitors for constant duty on the uppermost floor to meet the needs of the staff in the administration and care of the laboratories, library and herbaria.

Conservatories

The conservatories have been cared for in the usual manner. Houses no. 2, 3, 13 and 14 were repainted in the interior during the summer. New shades have been put in place as detailed by the Head Gardener. The breakage of glass during the year has been very small. It has been necessary to line up several batteries of steam pipes during the year and the doors at the main entrances demand constant attention from the carpenter and painter. Some important adjustments and replacements of broken parts of ventilating apparatus were carried out by Hitchings and Co. in November.

During many days in the year the crowd in the conservatories taxes the capacity of the aisles to the utmost, but the system of regulation is so effective that visitors have been able to inspect the collections without inconvenience at any time.

Constant attention to the labels of the plants reduces the misplacement of these important adjuncts to an exhibit to a minimum.

Propagating Houses

The propagating houses were maintained with only unimportant repairs. An area of 2,500 square feet immediately south of the propagating houses has been enclosed with wire netting eight feet in height, to protect the experimental cultures for the study of the origin of species that have been in progress for some time.

Power Plant

The heating and power plant has been maintained with a minimum of repairs. Only one break in the heating system has occurred, and this necessitated cutting off the steam from the museum for two days only. The trouble was due to a defective joint in the main and was put in order at slight expense.

During the summer the entire system was overhauled by the chief engineer, a number of frames and grate bars being replaced under the boilers. The certificate given by the manager of the inspection department of the United States Casualty Company, after the annual inspection, was accompanied by a letter stating that the entire power plant with its boilers, pumps, dynamos and other machinery were in excellent condition and showed unusually good care and intelligent handling.

Stable

The stable now furnishes accomodations for ten horses, and has been kept in order by the replacement of some of the floors and of the sloping approaches at the entrances.

Repair Shop

The repair shop has well repaid its maintainance. One man has been able to keep the tools and implements of the laborers and mechanics in order and to execute other simple repairs. It is still necessary to have horse-shoeing and re-

pairs to complicated machinery done outside, in places with special facilities for such work. A new forge and anvil were added to the equipment in November.

Publications

The JOURNAL has been published monthly during the year. The completed volume contains viii + 242 pages with 5 plates and 41 figures. The publication is devoted to a current account of the various activities of the Garden, including non-technical descriptions of scientific results obtained, organization, and additions to the collections and exhibits, progress of construction within the grounds, accessions of all kinds and accounts of the explorations which are now being prosecuted so vigorously.

BULLETIN No. 10, comprising pp. 175–287 of Vol. III, was issued March 22, 1904. It is devoted wholly to the reports of officers and committees for the year 1903.

BULLETIN No. 11, completing Vol. III, consists entirely of scientific papers. Three of these papers have been published separately in advance. The first, Mycological Studies, II, by Prof. F. S. Earle, was issued June 30, 1904; the second, The Comparative Embryology of the Cucurbitaceae, by Dr. J. E. Kirkwood, was issued October 7, 1904; the third, Additions to the Palaeobotany of the Cretaceous Formation of Long Island, No. II, by Dr. Arthur Hollick, was issued December 10, 1904. The completed BULLETIN will be published early in 1905.

CONTRIBUTIONS as follows have been reprinted from various periodicals during the year:

No. 51. Notes on Bahaman Algae, by Marshall A. Howe.

No. 52. The Polyporaceae of North America—VII. The Genera *Hexagona*, *Grifola*, *Romellia*, *Coltricia* and *Coltriciella*, by William Alphonso Murrill.

No. 53. Delta and Desert Vegetation, by Daniel Trembly MacDougal.

No. 54. Chemical Notes on "Bastard" Logwood, by Benjamin C. Gruenberg and William J. Gies.

No. 55. Studies on the Rocky Mountain Flora — XI, by Per Axel Rydberg.

No. 56. The Polyporaceae of North America — VIII, *Hapalopilus*, *Pycnoporus* and new monotypic genera, by William Alphonso Murrill.

No. 57. Studies in the Asclepiadaceae — VIII, A new species of *Asclepias* from Kansas and two possible hybrids from New York, by Anna Murray Vail.

No. 58. Relationship of *Macrophoma* and *Diplodia*, by Julia T. Emerson.

No. 59. Studies on the Rocky Mountain Flora — XII, by Per Axel Rydberg.

No. 60. The Polyporaceae of North America — IX, *Inonotus*, *Scsia* and monotypic genera, by William Alphonso Murrill.

No. 61. On *Pisonia obtusata* and its allies, by N. L. Britton.

Lectures

Two series of public lectures have been given, one in the spring and one in the autumn. Cards are sent to all members and an invitation is given to meet the Director and staff for a tour of an hour and a half around the grounds, plantations, and in the conservatories. The attendance at these lectures has been very gratifying, although unfavorable weather has reduced the number present in some instances. The full list of subjects and lecturers is given below.

April 30. "Japan, the Land of Lacquer and Bamboo," by Dr. C. F. Millspaugh.

May 7. "The Form, Habits and Relationships of the Cactuses," by Dr. N. L. Britton.

May 14. "The Vegetation of the Delta of the Colorado River, and of Baja California," by Dr. D. T. MacDougal.

May 21. "Explorations on the Yukon River, Alaska," by Dr. Arthur Hollick.

May 28. "Arctic and Alpine Plants," by Professor F. E. Lloyd.

June 4. "Carnivorous Plants," by Professor H. M. Richards.

October 1. "The Origin of Species as Illustrated by the Evening Primroses," by Professor Hugo de Vries.

October 8. "The Botanical Exploration of the Bahamas," by Dr. N. L. Britton.

October 15. "A Summer at the Desert Laboratory," by Professor Francis E. Lloyd.

October 22. "Botanizing in the Austrian Tyrol," by Dr. W. A. Murrill.

October 29. "Life-History of a Fern," by Professor L. M. Underwood.

November 5. "Fossil Plants of the Vicinity of New York," by Dr. Arthur Hollick.

November 12. "The Effect of Wounding on Plants," by Professor H. M. Richards.

November 19. "Hybrids; Their Nature and Behavior," by Dr. D. T. MacDougal.

In addition to the above, lectures have been given before the Horticultural Society of New York at the meetings held in the museum, by permission of the Board of Managers.

At the request of the Director of the Brooklyn Institute of Arts and Sciences, Dr. N. L. Britton, Director-in-Chief, gave a lecture on Cacti to an audience composed of members of the latter institution on December 7, 1904.

In addition, a number of conferences have been held for the advanced pupils of the public schools, and guides have been furnished for parties which have been brought to the Garden by teachers for the inspection of the collections. Material for nature study has also been furnished to a number of schools on request.

The botanical conventions, held bi-weekly in the library, continue to be a source of great profit to the entire staff and to the botanists of neighboring institutions who attend them. The meetings in question afford an opportunity of presenting the results of investigations at an early moment and also give opportunity for discussion by specialists in every branch of the subject.

The following subjects have been presented during the year:

January 20. Dr. Arthur Hollick, "Palaeobotanical Explorations in Alaska."

February 3. Professor H. M. Richards and Dr. D. T. MacDougal, "Influence of Carbon Monoxide on Plants."

February 17. Dr. M. A. Howe, "A Collection of Algae from the Bahamas."

February 17. Dr. P. A. Rydberg, "Some Features of Plant Distribution in the Rocky Mountains."

March 2. Miss Ada Watterson, "The Effect of Chemical Irritation on the Respiration of Fungi."

March 16. Dr. D. T. MacDougal, "Explorations in the Delta of the Rio Colorado and in Baja California."

April 6. Professor H. M. Richards, "The Responses of Protoplasm, with especial reference to the lower plants."

April 20. Dr. N. L. Britton, "Explorations in Florida, and Distribution of the Antillean Flora."

October 19. Dr. D. T. MacDougal, "The Mutants of the Evening Primroses."

November 2. Dr. Arthur Hollick, "Discoveries of Fossil Plants on Long Island."

November 16. Mr. Ira D. Cardiff, "The Development of the Sporangium in Botrychium."

November 16. Dr. N. L. Britton, "Professor Engler's Views of the Origin and Distribution of Plants in Northern Africa."

Meteorological Observations

Meteorological observations have been continued throughout the year and the records have been added to the series which has been kept continuously since 1900. The total precipitation for 1904 amounts to 47.01 inches. The total period between the latest occurrence of freezing temperature in the spring and the earliest in the autumn was 167 days, compared with 168 days in 1902 and 170 days in 1903. In addition to the ordinary standard instruments a thermograph which records the soil at a depth of 12 inches, and the air, has been added to the equipment. A second soil-thermograph is also in use by which the investigations begun in 1902

nave been continued. The receiver of the rain-gauge has been removed to the roof of the museum and is connected by a leading pipe of small caliber with the measuring cylinder in the physiological laboratory. In a comparison of records made in this manner with a gauge on the ground in the nursery, no material differences were found, and it has been decided to take the records only from the newly installed instrument.

Early in the year I was called upon to spend several days in attendance at the County Supreme Court in order to give testimony as to the conditions of rainfall during 1902, in a suit brought by a contractor to recover additional cost of construction from the city.

Laboratories

The appropriation for the laboratories has been expended in the increase of the equipment at all points, an extension made necessary by the constantly widening scope and importance of the investigations pursued in the Garden. Professor W. J. Gies has continued to act as consulting chemist, visiting the laboratories for the purpose of conference with persons engaged in chemical researches, once and sometimes twice weekly during the collegiate year. Mr. B. C. Gruenberg, in coöperation with Dr. Gies, completed an investigation of the chemical properties of the so-called "bastard logwood," which is a disturbing factor in the dyewood markets of the West Indies, and the results were described in the Bulletin Torrey Club, being reprinted as Contribution No. 54 under the title "Chemical Notes on Bastard Logwood." Other results are in course of preparation for the printer.

Dr. C. S. Gager, professor of biology in the State Normal College of New York, at Albany, has secured leave of absence from his chair for a year, and acts as assistant in the laboratories. Dr. Gager devoted the greater part of his attention to an investigation of the anatomical expression of the qualities of hybrids of the evening-primroses, making

comparative studies between Lamarck's evening-primrose and the common evening-primrose of eastern America; also studying the difference between the relations of these hybrids with the first parent, and with mutants of the same parent.

Tropical Laboratory

The tropical laboratory at Cinchona, Jamaica, has been maintained in readiness for the use of investigators who might visit it for the purpose of forwarding investigations of various kinds. Eight persons in all have made use of the facilities during the present year, and the test of actual use shows that the establishment of this laboratory was a much needed and very efficient extension of the activity of the Garden.

It has been necessary to make only small expenditures for apparatus and supplies for this laboratory during the year. The extremely economical manner in which this laboratory is maintained is due to the practical and vigorous coöperation of Hon. Wm. Fawcett, Director of the Public Gardens of Jamaica, who acts as the representative of the Garden in Jamaica, and who kindly places at the disposal of visiting investigators the additional facilities of the laboratories and library at Hope Gardens, Kingston, Jamaica.

Special Investigations

The following alphabetical list contains the names of all persons to whom the privileges of the Garden have been granted for extended periods during the year, together with brief notes as to the special investigations pursued while in residence.

LeRoy Abrams. University of Southern California; Stanford University, A.B., 1899; A.M., 1902. Assistant in botany, Stanford University, 1900–1902. Instructor in botany, Stanford University, 1902–1904.

The flora of southern California.

Harriet Brown Bailey.

The flora of northeastern America, with special attention to the mosses of this region.

HOWARD JAMES BANKER. Syracuse University, A.B., 1892; Columbia University, A.M., 1900. Professor of biology, De Pauw University.

A study of the Hydnaceae.

MARY FRANKLIN BARRETT. Smith College, B.L., 1901.

Taxonomy of the Tremellales.

ELIZABETH BILLINGS.

A systematic study of the grasses of Vermont.

IRA DIETRICH CARDIFF. Knox College, B.S., 1897. University of Chicago, 1899–1904, in part.

Life-history of certain pteridophytes.

MARY COE CHEDSEY. Teachers College, Columbia University, B.S., 1904.

Anatomy and physiology of growth.

ANNA MAY CLARK. University of Vermont, Ph.B., 1898.

The life-histories of selected cryptogams.

WILLIAM CHAMBERS COKER. South Carolina College, B.S., 1894; Johns Hopkins University, Ph.D., 1901. Professor of botany, University of North Carolina.

Flora of the Bahamas.

AMELIA BLAIR CRANE. Barnard College.

Morphology of fleshy fungi.

JULIA TITUS EMERSON. Assistant in the laboratories, Sept., 1903.

An investigation of a disease of the roots of *Rosa* caused by parasitic organisms; and of the chemical properties of *Ibervillea*.

EDNA HAGUE FAWCETT. Smith College, B.L., 1901.

Senescence in plants.

BENJAMIN CHARLES GRUENBERG. University of Minnesota, B.S., 1896. Sugar-testing laboratory, U. S. Appraisers' Stores, N. Y. City. Instructor in biology in High Schools, N. Y. City.

Mycorrhizas.

ROLAND MCMILLAN HARPER. University of Georgia, B.E., 1897.

The flora of Georgia.

CAROLINE COVENTRY HAYNES.

A systematic study of some of the Hepaticae.

FLORENCE HENRY. Cornell University, A.B., 1901; Columbia University, A.M., 1902.

Palaeobotany.

Nellie Priscilla Hewins. Cornell University, B.S., 1898; Columbia University, M.A., 1900.

Reactions of foliar organs to wounds.

Ida May Hope. Barnard College, A.B., 1903.

Relation of wound-tissue of plants to bacterial infection.

William Titus Horne. University of Nebraska, B.S., 1898; further work at same institution, 1898–1900. Fellow in Columbia University, 1903–1904.

Parasitic diseases of plants; formation and significance of alkaloids in plants.

Homer Doliver House. Syracuse University, B.S., 1902. Later appointed assistant in botany, Columbia University.

A systematic and anatomical study of the Convolvulaceae, and an experimental series of observations on carpotropic movements. Influence of ions upon seedlings.

Cyrus Ambrose King. State University of Indiana, A.B., 1893; Harvard University, A.B., 1897; A.M., 1898; Ph.D., 1902.

Cytology of the Phycomycetes.

Joseph Edward Kirkwood. Pacific University, A.B., 1898; Princeton University, A.M., 1902; Columbia University, Ph.D., 1903. Associate professor of botany, Syracuse University.

Embryology of the Cucurbitaceae; flora of saline areas in New York. Research scholarship July 1 to September 1, 1904.

Alice Adelaide Knox. Smith College, A.B.

Anatomy of *Ibervillea Sonorae*.

Elsie M. Kupfer. Columbia University, A.B., 1899; A.M., 1901. Instructor in biology in Wadleigh High School Annex.

An anatomical and physiological study of *Baccharis genistelloides*, and a series of studies upon the subject of regeneration of plants.

Marion Elizabeth Latham. Columbia University, A.B., 1903.

Investigation of the stimulating effect of chloroform on the growth of fungi.

Flora Virginia Livingston.

Morphology of fungi.

Lucy MacIntyre.

Morphology of certain algae.

CHESTER ARTHUR MATHEWSON. University of Cincinnati, 1901–1903; Yale University, 1903–1904.

Pollen-tubes in *Houstonia*.

CHARLES FREDERICK MILLSPAUGH. Student, Cornell University, class of '75; New York Homeopathic Medical College, M.D., 1881. Curator, Department of Botany, Field Columbian Museum.

The flora of the West Indies.

ROSINA JULIA RENNERT. Normal College of N. Y. City, A.B., 1897; Columbia University, A.B., 1901; A.M., 1902.

An anatomical and physiological study of *Oxypolis filiformis*.

CHARLES BUDD ROBINSON. Dalhousie University, A.B., 1891; student at Cambridge University, England, 1897–1899.

The Characeae of eastern America; carpotropic movements of plants. Research scholarships for seven months.

WINIFRED JOSEPHINE ROBINSON. Michigan State Normal School, B.Pd., 1892; University of Michigan, B.S., 1899. Instructor in biology, Vassar College.

The physiology of the formation of tubers, and a taxonomic study of *Cordyceps*.

NATALIE SOPHIE ROETH. Mt. Holyoke College, 1898.

AUGUSTINE DAWSON SELBY. Ohio State University, B.S., 1893. Botanist and chief of the department of plant physiology and pathology of the Ohio Agricultural Experiment Station.

Investigations in the chemical physiology of plants, and of fungal parasites affecting the grape.

MARGARET SLOSSON.

A study of the early stages of certain ferns.

LILLIAN STEWART. Carleton College.

Anatomy and physiology of growth.

CHARLES RUPERT STOCKARD. Mississippi Agricultural and Mechanical College, B.S., 1899; M.S., 1902.

Cytological changes in gland-cells of *Vicia Faba*.

MARGARET HOLMES STONE. Barnard College, A.B., 1904.

Anatomy and physiology of growth.

MORRIS CRAWFORD VALENTINE. City College of New York, A.B., 1896. Student in Medical School of Columbia University, and in the Pathological Institute, Hospital for the Insane.

Relations of certain snails to algae.

Chung Yu Wang. Columbia University, A.M., 1904.
Palaeobotany.

Edwin Mead Wilcox. Ohio State University, B.S., 1896; Harvard University, A.M., 1898; Ph.D., 1899. Professor of botany, Alabama Polytechnic Institute.
Hybrids of *Ricinus* and bibliography of hybridization.

Emma Marie Wold. Western College; University of Oregon, A.B., 1894; A.M., 1897.
Stimulative reactions of plants. Morphology of algae.

George Clayton Wood. Syracuse University, A.B., 1900.
The lichen-flora of the eastern United States.

Shigeo Yamanouchi. Higher Normal School, Tokyo. Assistant Professor, Higher Normal School, Tokyo.
Stimulative reactions and morphology of algae.

Naohidé Yatsu. Tokyo University, Rigakushi (A.B.), 1900.
Cytological changes produced by chemical stimulation, and by mechanical injury.

The total registration of students for the year 1904 includes 45 persons, who represent by degrees received, or by incumbencies held, 43 institutions of collegiate rank or scientific purpose. One held a research scholarship for one month, one for two months and one for a period of four months and a second period of three months.

My investigations upon heredity and origin of species begun in 1902 have been continued and some results of value have been attained. A special area has been enclosed for the cultural work in the open air, and this, with the facilities afforded by the experimental house, has given opportunity for much critical work. Some attention has been directed to a cultural test of Lamarck's evening-primrose and its mutants, and a study has been made of the constancy of the various forms involved under the climatic conditions obtaining at the Garden. Fourteen mutants of specific and varietal rank have been seen to originate from the form named above, a few of which are not recognizable as being identical with forms produced in Amsterdam. Mutants of other species have also been secured and will be duly described in papers

now in preparation. A detailed study of some hybrids of the evening-primroses has also been made with a view to a comparative study of the hybrid progeny with the parents, and with mutants from the same parent. Miss A. M. Vail, Dr. G. H. Shull of the Station for Experimental Evolution of the Carnegie Institution, and Dr. J. K. Small have coöperated with me in this work, the principal results of which are to be published by the Carnegie Institution under the title "Mutants and Hybrids of the Oenotheras." This paper is now in press and will be issued in March, 1905.

A separate series of experiments upon the acquisition of new characters and the inheritance of the same has been in progress since 1902, but no definite results have been obtained.

The investigations of the relations of plants to carbon monoxide, with Professor H. M. Richards, have been continued, and the results are embodied in a lengthy paper which will be offered for publication shortly.

The investigations upon the relations of soil-temperatures to vegetation, begun in 1900, have been continued and I now have two soil thermographs installed at the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona, for the purpose of comparison with the results obtained from the two instruments installed in the Garden. A new form of the Hallock thermograph has been devised in which the temperature of the air and of the soil at a single point are registered on one recording cylinder simultaneously.

I have had occasion to visit the Station for Experimental Evolution at Cold Spring Harbor, as an associate of that institution, for the purpose of consultation with Dr. C. B. Davenport and Dr. G. H. Shull upon the work on descent and heredity being carried on at that place.

At the request of Professor de Vries, I have edited and revised his lectures upon "Species and Varieties: Their Origin by Mutation," delivered at the University of California during the summer of 1904. The lectures will appear as a single volume of xviii + 847 pages, published by the Open Court Company of Chicago.

During the latter part of January and February a trip to the Southwest was made, in the course of which a week was spent in conference with Dr. W. A. Cannon concerning the researches in progress at the Desert Botanical Laboratory.

In accordance with arrangements previously made, Mr. G. Sykes, civil engineer, of Flagstaff, Arizona, had a small sloop constructed at Yuma, Arizona, and on February 27, in company with him, Professor R. H. Forbes and an assistant, I started down the Colorado River for an exploration of its delta and of some of the contiguous desert areas in Lower California. A small collection of plants embracing over a dozen new species, two of which are trees, was made, and a mass of data dealing with the climatic and floristic features of the region was accumulated. Some of the results are embodied in a paper entitled "Desert and Delta Vegetation," published in the Botanical Gazette for July, 1904, and reprinted as Contribution 53 of the Garden.

Respectfully submitted,

D. T. MacDougal,

Assistant Director.

REPORT OF THE CURATOR OF THE MUSEUMS AND HERBARIUM

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: I have the honor to submit herewith my report as Curator of the Museums and Herbarium for the year 1904:

The general development of the collections, comprising Museums and Herbarium, was continued, while many new features and appliances were introduced as occasion demanded, especially where the efficiency of the public exhibits and the study collections could be increased.

1. GENERAL ACCESSIONS. During the year the permanent collections have been increased by 60,552 specimens. In addition to these, 42,164 specimens previously received have been incorporated, the total additions to the permanent collections thus amounting to 102,716. Increased facilities for preparing and installing specimens enabled us to make the great bulk of our accumulated materials available for inspection and study.

During the handling of this material many duplicate specimens were brought together and exchanged for other specimens to be used in the permanent collections.

(*a*) *Gifts and purchases.* Donations of specimens, and means for securing them in addition to the regular appropriation, have increased the collections by 23,873 specimens.

(*b*) *Exchanges.* Exchanges of museum and herbarium material with other institutions and individuals have added 9,755 specimens. The great majority of these have already been, or will be, incorporated into the permanent collections of the Garden. Exchanges have been continued with many of the institutions mentioned in my previous reports, while exchange relations have been established with the following:

Estación Central Agronómica de Cuba.

Imperial Department of Agriculture for the British West Indies.

University of Arizona.

Bureau of Public Laboratories, Manila.

United States Geological Survey.
Oberlin College.
Hawaiian Experiment Station.
Academy of Natural Sciences, Philadelphia.

(*c*) *Exploration.* Exploration of various parts of the North American mainland, the West Indies and the Philippine Islands has brought together 24,961 specimens. The great majority of these, and especially the more important ones, have already been incorporated in the permanent collection.

2. Plant Picture Collection. This was not notably increased during the year, but 669 plates and photographs were added. Plates and photographs were withdrawn for use in the museums and herbarium as occasion demanded.

Museums

1. Accessions. No attempt was made to increase greatly the exhibits of either museum, as the care of the already accumulated material taxed the capacity of the museum force; in all 1,203 specimens were added; this material was secured chiefly by members of the staff during explorations, and by miscellaneous gifts.

The bulk of previously acquired material having now been installed, we are in a position to solicit and purchase material to more fully illustrate the plants and plant products, thus increasing the usefulness of the museum.

2. Preparation of Material for Exhibition and Appliances. The plan briefly outlined in my last report has been carried out, and all specimens, with the exception of duplicates, have been installed.

Mechanical appliances, as heretofore adopted and used, have been continued and new ones put into service as particular cases called for.

The following standard parts of museum equipment have been secured:

(*a*) *Exhibition blocks.* Wooden blocks of the following sizes and quantities, for the mounting of specimens, were ebonized:

Size of blocks.	Number.
4 x 4 inches.	711
4¾ x 4¾ "	812
4¾ x 8 "	50
5½ x 5½ "	307
7 x 7 "	218
Total,	2,098

(*b*) *Glass jars.* (Specimen jar, 2605, Whitall Tatum Co.).

Diameter.	Height.	Number of jars.
2 inches.	5 inches.	120
3 "	6 "	120
3 "	8 "	48
3¾ "	10 "	24
4½ "	12 "	72
	Total,	384

(*c*) *Ring-stands.* These are made of thin wire, with gun-metal finish, and consist of a standard and two rings. About 500 were used, especially in the mounting of the collection illustrating North American Dendrology.

(*d*) *Gray cardboard for exhibiting plants, plates and photographs.* The growth of the exhibits required the addition of standard cardboards as follows:

Size of cards.	Number of cards.
7 x 11 inches.	200
11 x 11 "	200
11 x 14 "	300
14 x 22 "	300
13¾ x 18¼ "	400
Total,	1,400

3. Economic Museum. The number and arrangement of the exhibition cases of this museum remain the same as during the previous year. Each case has been supplied with a metal number in the upper left hand corner and a large label stating the contents in the center directly over the doors. The arrangements of exhibits in the cases is as follows:

Cases numbers 1–18,	Fibers and fiber products.
Case number 19,	India rubber and allied products.
Cases numbers 20–22,	Resins.
Cases numbers 23–26,	Spices and flavoring agents.
Cases numbers 27–30,	Fodder plants.
Cases numbers 31–32,	Tobacco.
Case number 33,	Masticatories.
Case number 34,	Miscellaneous plant products.
Case number 35,	Coffee.
Case number 36,	Chocolate.
Cases numbers 37–38,	Beverages.
Case number 39,	Fixed oils.
Cases numbers 40–42,	Volatile oils.
Cases numbers 43–44,	Starches.
Cases numbers 45–46,	Sugars.
Case number 47,	Cork.
Case number 48,	Strawpaper.
Cases numbers 49–50,	Woodpulp and paper.
Cases numbers 51–68,	Foods.
Cases numbers 69–86 and 169–186,	Drugs.
Cases numbers 87–90 and 157–168,	Woods.
Case number 160,	Carbons.
Cases numbers 91–156,	North American Dendrology.

4. Systematic Museum. The readjustment and building up of this museum has been continued on the plans mentioned in my last report:

(*a*) *Synoptic collection.* This, the main department of the systematic museum, has been brought into an approximately complete condition in so far as our present equipment of cases permits. Each case has been furnished with a number in the upper left hand corner, while a large label stating the contents of each, together with a concise definition of the group of plants there represented, has been placed in the center above the doors. This collection now occupies 128 cases, and its present arrangement is as follows:

Case number 1,	Myxomycetes (slime moulds).

Cases numbers 2–36,	Thallophyta	2–16, Algae (seaweeds). 17–32, Fungi. 33–36, Lichenes (lichens).
Cases numbers 37–48,	Bryophyta	37–40, Hepaticae (hepatics, scale mosses, liverworts). 41–48, Musci (mosses, peat mosses).
Cases numbers 49–55,	Pteridophyta (ferns and fern-allies).	
Cases numbers 56–128,	Spermatophyta	56–58, Gymnospermae (cone-bearing plants). 59–128, Angiospermae (fruit-bearing plants).

(*b*) *Local flora.* Specimens for portions of this department, heretofore imperfectly set up, have been brought together as rapidly and as fully as possible. The portions now in need of development are the Algae and the Fungi. Other divisions of this collection have been strengthened and enlarged as specimens for that purpose were acquired.

Some changes in the mechanical devices of the cases were made and have proved of great advantage. Each stand has been furnished with a four-sided frame at the top, in which labels are placed stating the scope of the collection and the contents of the stand. The 26 stands comprising this department have been divided into groups as follows:

Stands numbers 1–3,	Myxomycetes and seaweeds (incompletely installed).
Stands numbers 4–8,	Fungi (incompletely installed).
Stand number 9,	Lichens.
Stand number 10,	Hepatics and mosses.
Stand number 11,	Ferns and gymnosperms.
Stands numbers 12–26,	Angiosperms.

(*c*) *Microscope exhibit.* This exhibit has remained nearly the same as last year, with the exception of occasional change of objects, the renewal of the explanatory labels and several mechanical improvements added from time to time to each instrument. The objects shown are still restricted to examples from the flowerless plants.

5. Fossil Plant Museum. All the boxes of fossil plants have been unpacked and the specimens distributed in their proper stratigraphic sequence in the trays of the several table-cases.

Arranging the collections under their respective geologic horizons has been continued systematically, each collection being kept separate, and a tray or trays labelled with the name of the locality. Special attention has been given to the carboniferous plants and Dr. Newberry's important collection of Ohio coal-plants has been subjected to critical examination, and the type specimens have been specially marked and listed.

The work of arranging and identifying the specimens upon which Dr. Newberry's "Flora of the Amboy Clays" was based, has been completed and the duplicate specimens are now available for exchange.

A slight rearrangement of the Jura-Trias table-case has been made, in order to allow the display of specimens from Italy and France, recently received in exchange from the Museum of Natural History at Paris.

6. Labeling. Considerable time was devoted to the work of labeling. The main collections of the public museums, namely, the display collections of the fossil plant museum, the general economic collection, the synoptic collection, the local flora collection and the microscope exhibits, have been almost completely furnished with labels.

7. Care of Exhibits. A general rearrangement of the exhibits resulted in the detection of any deterioration of specimens and remedies were applied as cases demanded. Insect depredation was checked by the use of mercuric bichloride, carbon bisulphide, chloroform and alcohol. Many specimens were replaced by better or more illustrative ones, while the general cleaning of the specimens was prosecuted as heretofore.

8. Uses of the Museums. The attendance of the public has been much greater than in former years, and it has also shown a steady increase as the year advanced. The attend-

ance of students under the guidance of instructors from New York City and from neighboring states has markedly increased, and a greater interest has naturally been taken in the public museums as the collections have been made more complete. The microscope exhibit continued to be especially attractive to the general visitors, while the local flora exhibit has proved especially helpful to teachers and investigators.

Students and investigators have used the collections in connection with instruction and research, while importers and manufacturers have had access to the exhibits of the economic museum, in consultation with the members of the Garden staff.

Herbarium

1. Accessions. The herbaria have been increased by 59,349 specimens from all parts of the world. The explorations carried on by the Garden, in America and in the Philippine Islands, have notably enriched these collections. Considerable exchanging of duplicate material with other institutions has also added many desirable specimens. Most of the current distributions of plants by private collectors have been secured. The algal collections have been enriched by much material secured by Dr. Howe in subtropical waters, and by miscellaneous specimens, many of them cotypes, secured at various institutions during his recent trip to Europe. The fungal collections have grown in importance through the efforts of Mr. Earle and Dr. Murrill. Their personal collections in eastern North America have alone added much of value to the knowledge of this imperfectly known group of plants. The bryophytic collections have been augmented by the collections of Mrs. Britton on the North American mainland and in the Bahamas, and by other specimens secured by members of the staff. The more valuable additions of flowering plants are from America, Europe and southeastern Asia.

2. Mounting and Conserving of Herbarium Material. During 1903, especial effort was made to bring together all the accumulated cryptogamic material not incor-

porated in the permanent collection, and at the time of the writing of my last report this was essentially accomplished. During the present year attention has been given to the mounting of the miscellaneous accumulation of phanerogamic material, thus bringing into use the entire research collections of the institution. This task has been accomplished, with the exception of a few securely boxed portions of recently acquired herbaria, which we hope to mount during the early part of next year.

Specimens at all liable to insect depredation have been thoroughly poisoned with mercuric bichloride, both to insure their permanent preservation, and to avoid the necessity of frequent and undesirable fumigation in the future.

(*a*) *Flat or pressed specimens.* A total of 82,916 herbarium sheets, representing at least 95,000 specimens, have been incorporated.

(*b*) *Bulky specimens.* Fully 5,800 specimens of dimensions prohibiting their being mounted on herbarium sheets, consisting mainly of fungi and lichens, stems of tree-ferns, and fruits and seeds of flowering plants, have been placed in multiple paper boxes of the following sizes:

Size of boxes.	Number of boxes.
5/8 x 2 5/8 x 3 7/8 inches.	1,500
1 1/4 x 2 5/8 x 3 7/8 "	1,500
1 1/4 x 5 1/4 x 3 7/8 "	1,000
2 1/2 x 2 5/8 x 3 7/8 "	1,000
2 1/2 x 5 1/4 x 3 7/8 "	800
Total,	5,800

3. Arrangement of the Herbaria. The general disposition of the collections has not been altered during the year, but numerous minor changes have to be made from time to time to accommodate the unequal growth of the several divisions.

(*a*) *Garden herbarium.* An aggregate of 58,055 specimens was received. From these and from previously acquired material about 94,000 specimens, mounted on 74,916 sheets, were incorporated.

Herbaria in addition to those mentioned in previous reports now incorporated are:

The C. L. Anderson herbarium.
The L. T. Chamberlain herbarium.
The Nicolas Pike herbarium.

The local herbarium, containing only plants growing within one hundred miles of New York City, has been constantly added to by specimens obtained as gifts, by exchanges, and by the collections brought together by representatives of the Garden detailed to accompany the weekly field excursions of the Torrey Botanical Club, as well as by those selected from the general collections coming into the possession of the Garden from time to time. All the material originally received as the herbarium of the Torrey Botanical Club, and which formed the nucleus of this local collection, has been mounted and rearranged so as to be readily accessible.

(*b*) *Columbia University herbarium.* For this collection 1,294 specimens were received. From these and from material previously accumulated, about 700 sheets containing 877 specimens were distributed in the cases. Imperfectly mounted specimens have been permanently mounted as far as time and assistance permitted, while such portions as were constantly handled in connection with the duties of members of the staff and the research work of the students were remounted or securely strapped to the sheets. Some progress has been made on the incorporation of the Morong collection, the property of Barnard College, in the general Columbia herbarium.

(*c*) *Duplicate herbarium.* Specimens secured by members of the staff on trips of exploration, not needed for the permanent collection, and similar material from other sources, have been placed in this series, and have from time to time been sent to individuals or other institutions in exchange for desiderata. In this way over 12,200 specimens were distributed.

5. Uses of the Herbarium. The herbarium has been used primarily for three purposes: (1) In connection with the

development of other departments of the Garden. (2) For research work of members of the staff. (3) In connection with instruction and research privileges offered by the Garden, and by Columbia University.

Visiting students and officers of other institutions have had access to the collections, while many qualified persons have been permitted to consult the specimens upon application to the Director-in-Chief.

Assistance and Investigations

The general care of the museums, the mounting of herbarium material and the printing of labels has been under the supervision of Dr. Shafer, Museum Custodian, who has devoted considerable time to the collection of economic material with special reference to local medicinal plants and the arboreous flora, in connection with which he is making special investigations. He has continued his studies of plants of western Pennsylvania and of Cuba, and has completed some investigations on *Cassia marylandica* and a related species, the results of which have lately appeared in "Torreya."

The development and care of the fossil plant museum has been under the supervision of Dr. Hollick, Assistant Curator. He was granted leave of absence for the months of April, May and June, in order to prosecute work for the U. S. Geological Survey on the fossil flora of the Cretaceous formation in the vicinity. This involved both field work and the identification and drawing of specimens collected by others. Two weeks in July were devoted to field work for the Maryland Geological Survey, on the fossil flora of the Pleistocene formation in that State. At various times, when circumstances permitted, he prosecuted field work on Long Island and Staten Island, and a considerable number of fossil plants were collected. The results of the work on Long Island have been published in the BULLETIN of the Garden, Vol. 3, No. 11. Late in the autumn the Cretaceous clays at Kreischerville, Staten Island, were examined by Dr. Hollick, and an interesting collection of fossil leaves and amber was ob-

tained by him. The facts in connection with the amber were embodied in a paper which was read before the Botanical Society of America at the Philadelphia meeting in December. The fossil leaves are being subjected to careful study and will form the basis of a forthcoming paper.

Dr. Howe, Assistant Curator, has cared for the collection of algae and that of the hepatics. He spent about five weeks in March and April in collecting and studying marine algae in Florida and the Bahamas, while the months of June, July, August and September were devoted to visiting European botanical institutions for the purpose of seeing and studying the historical types of American algae. Besides the reports on the above mentioned trips, Dr. Howe's publications during the year include an account of "The Museum Exhibit of Seaweeds" and of "The Pike Collection of Algae," printed in the Garden Journal for March and April, respectively; "Notes on Bahaman Algae," collected by Professor W. C. Coker, printed in the Bulletin of the Torrey Botanical Club for February; and a few briefer notes and reviews, published in Torreya, of which he is the editor. His research work has consisted chiefly of systematic studies of the American marine algae, particularly of his own collections in the West Indian region.

During the early part of the year Mr. Earle, Assistant Curator, had charge of the collection of fungi and allied groups of plants. In addition to his duties in arranging and caring for the fungus collections in the herbarium and museum, much time was devoted to determining the types of the older genera of fungi and to continuing his work on the Agaricaceae of North America. Mr. Earle published a paper in Science on "The Necessity of Reform in the Nomenclature of the Fungi," and "Mycological Studies II," including descriptions of a number of new species of tropical American and West American fungi, was printed in the BULLETIN of the Garden. He resigned his position at the Garden in June to take up his new work as Director of the Agricultural Experiment Station in Cuba.

During the latter part of the year Dr. W. A. Murrill, Assistant Curator, was appointed to the position formerly held by Mr. Earle. During the summer Dr. Murrill collected extensively in the mountains of Virginia and Tennessee. Upon his return the specimens collected were determined, classified and listed. About a thousand specimens sent from all parts of the country have been determined and reported upon by Dr. Murrill. He has brought together all the available notes and references to the North American species of polypores, and has devoted considerable attention to the study and publication of the Polyporaceae of North America. Several papers of a continued series treating this subject have already been printed, and others are nearly completed. He has also begun to print in Torreya a series of keys to the species of polypores occurring in the United States and Canada, and has prepared a list of polypores occurring in the Philippines and adjacent regions with a view to determining more fully the important collections of recent explorers in that region.

Mrs. Britton has continued her voluntary aid, especially in reference to the development of the moss collections, and has supervised the mounting and distributing of specimens, as well as taking charge of the naming of the mosses. She has made a comparative study of the collections of mosses from southern peninsular Florida with those of Cuba and the Bahamas, preliminary to publication. Many of these specimens are of her own collecting, as she has accompanied Dr. Britton on his trips of exploration and assisted in gathering specimens, particularly of mosses, and hepatics, lichens and fungi. She has published notes on various genera of mosses in The Bryologist, and short notes in Torreya, and acted as secretary of the Wild Flower Preservation Society of America, taking charge of the distribution of the reprints of the prize essays published by the aid of the Stokes Fund, and has supplied the Plant World with short notes.

Professor Underwood has voluntarily cared for the ferns and fern-allies, and has brought nearly all of the specimens of the large collection of these plants into uniform order.

The main curatorial duties in connection with the flowering plants have as usual devolved on Dr. Rydberg, Assistant Curator. In addition to these duties he has continued his studies on the flora of the Rocky Mountain region and has also made progress in the manuscript of the manual of the plants of that region which he is preparing. Dr. Rydberg has completed the work on his "Catalogue and Key to the Flora of Colorado." He has also prepared monographs of several of the families for the forthcoming part of the North American Flora. His published papers for the year comprise Nos. 11, 12 and 13 of his "Studies on the Rocky Mountain Flora."

The writer devoted time not required for general curatorial duties to monographing the North American representatives of several plant families and to developing a collection of camera-lucida drawings of the floral parts of North American plants. Exploration was prosecuted during two trips to Florida and special investigations on the flora of southern peninsular Florida were carried on, both by means of field work and the study of specimens secured while in the field.

Respectfully submitted,

J. K. Small,

Curator of the Museums and Herbarium.

December 31, 1904.

REPORT OF THE HONORARY CURATOR OF THE ECONOMIC COLLECTIONS

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: I have the honor to submit the following report for the year 1904:

As proposed in my last annual report, the year has been devoted chiefly to caring for the collections already in hand, installing and rearranging them in the new cases, and completing their labeling.

Considerable has, however, been done in securing new acquisitions, more than 500 specimens having been added.

One of the most important additions consists in a large number of twigs, winter-buds, and fruits, connected with the North American dendrological collection, most of which have been collected for the purpose by Dr. Shafer. The increasing interest of botanists, in all departments, in the winter characters of plants, lends great scientific interest to this series, aside from its economic relations.

Mr. Nash has supplemented his wood collections from Haiti by a series of 20 specimens from the island of Inagua.

Dr. Small has added to our tannin exhibit a fine series of specimens from Florida, illustrating the tanning products of saw palmetto and mangrove. Dr. Small also brought from southern Florida some specimens of wild lemons and oranges, showing a remarkable adaptation of that region to the growth of these fruits.

From Dr. MacDougal we have received an extensive series of specimens representing confections made by the Indians and Mexicans of the southwestern United States and adjacent Mexico, from the fruits and stem-pulp of various cactuses.

Probably the most important addition of the year, from a strictly economic standpoint, is a large collection of india rubbers, presented by The India Rubber World, of this city, and forming an excellent illustration of what is now being

done in the East Indies, in the cultivation of rubber plants and the preparation of rubber.

A full collection of maple sugars and maple syrups has been presented by the Vermont Maple Sugar Makers' Market, of Randolph, Vermont.

Messrs. Dodge & Olcott have added to their valuable donation of vanillas a set of Tonka beans and other coumarin-yielding drugs, and of natural and artificial coumarins.

Professor Roberts, of the Manhattan Agricultural College, Kansas, has donated a number of varieties of maize.

A valuable set of logwoods has been donated by Mr. B. C. Gruenberg illustrating his investigations of so-called "Bastard Logwoods."

Present inspection of the cases shows that the enlarged accommodations, though not crowded, and capable of providing for current growth for some time to come, are well enough stocked to present a very creditable appearance. They do not yet, however, present the attractiveness to the general public that is desirable. A visitor knowing something of a special subject, and coming for the purpose of gaining additional information from the study of our collections, finds much useful material; but the casual visitor, looking into one of our cases at a series of specimens of which he has no previous knowledge, finds our exhibits in many cases more or less unintelligible. This situation should be improved in the interest of the educational character as well as of the general attractiveness of the Museum. Two simple methods for accomplishing this result are available. One is the use, in suitable instances, of explanatory labels, when a small amount of text will serve the purpose of explanation. This method will be employed during the coming year.

A more efficient, though far more troublesome and expensive method, is the distribution to interested visitors of tracts or circulars of information relating to the exhibits. Suitable subjects for this method of treatment are, for example, Chocolate and its Production; Camphor, its Collection, Manufacture and Commerce; the Preparation and Uses

of Vanilla; the Turpentine Industry; Nuts as Articles of Food. Such articles might be printed as contributions to the Journal and reprinted for distribution. Notices might be posted in the cases containing the exhibits to which such articles relate, informing the public that the documents may be had, with payment or without, on application at the office. Probably a small charge for such literature would add to its appreciation by recipients.

Respectfully submitted,

H. H. Rusby,

Honorary Curator of the Economic Collections.

REPORT OF THE LIBRARIAN

To the Director-in-Chief.

Sir: I have the honor to submit the following report on the Library, covering the period from January 1, 1904, to January 1, 1905.

A census of the library was taken on December 20, and the number of bound volumes was then found to be 15,757, showing an increase for the year of 1,166 volumes. Of these, 149 were purchased from the special book fund, 216 volumes were purchased by the library appropriation, 694 volumes were presented to the Garden, the remainder having been acquired by subscription and exchange. Of the great number of unbound pamphlets no estimate has been made.

During the year 672 volumes have been bound, of which 97 volumes are serials and pamphlets deposited at the Garden by Columbia University.

The card-catalogue has been kept up to date; about 5,300 written cards having been added to it.

The rapid increase of cards has necessitated the construction of another special card-index case, which has been installed and partly filled. Four four-drawer filing cases have been placed in the reading-room for the accommodation of the rapidly increasing collection of plates, photographs and drawings, that hitherto have been stored in one of the laboratories.

By the purchase of 71 volumes from the library of Mr. John J. Crooke, and a collection of over 1,100 pamphlets from that of Mr. J. B. Ellis, the library has acquired many valuable and interesting items.

During the early part of the year, the Trustees of Columbia University presented to the library a collection of reports and publications of state agricultural and horticultural societies and institutions, amounting to over 500 volumes. They have also continued to present collections of botanical dissertations and pamphlets from time to time. A complete and very

handsome set of Rees' Cyclopaedia has been received from the Director of the Royal Gardens at Kew.

Additional exchanges have been arranged with other institutions, and the number of journals, periodicals and reports now received in that way in exchange for Garden publications is about 455 as against 305 during 1903.

A number of duplicate books and pamphlets have been disposed of either by exchange or sale.

Accessions to the library, other than serials and regular exchanges, have been published monthly in the Journal.

Besides the regular administration of the library, determinations and studies of the Asclepiadaceae have been continued, some of the results of which have been published in Contribution No. 57, under the title of "Studies in the Asclepiadaceae—VIII." I have also participated in the studies of the origin of species by mutation and of hybridization as demonstrated in the genus *Oenothera*, which have been in progress at the Garden during the past year by Dr. MacDougal, Dr. John K. Small, and Dr. G. H. Shull, the results of which are to be published by the Carnegie Institution of Washington. This work is still in progress. I have also assisted in the preparation for the press of Professor Hugo de Vries' lectures, "Species and Varieties: Their Origin by Mutation," now in press, and to be published by the Open Court Co.

Respectfully submitted,

ANNA MURRAY VAIL,
Librarian.

LIST OF PERIODICALS

* Académie Internationale de Géographie Botanique, Le Mans, France. *Bulletin.*

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* Periodicals subscribed for by the Garden.

† Periodicals subscribed for by Columbia University and deposited at the Garden.

‡ Periodicals received in exchange by the Torrey Botanical Club and deposited at the Garden.

All others are received in exchange by the Garden.

Agricultural Experiment Station, Auburn, Ala.
" " " Tuskegee, Ala.
" " " Uniontown, Ala.
" " " Tucson, Ariz.
" " " Fayetteville, Ark.
" " " Berkeley, Calif.
" " " Fort Collins, Colo.
" " " New Haven, Conn.
" " " Storrs, Conn.
" " " Newark, Del.
" " " Lake City, Fla.
" " " Experiment, Ga.
" " " Honolulu, Hawaii.
" " " Moscow, Idaho.
" " " Urbana, Ill.
" " " Lafayette, Ind.
" " " Ames, Ia.
" " " Manhattan, Kans.
" " " Lexington, Ky.
" " " Baton Rouge, La.
" " " Orono, Me.
" " " College Park, Md.
" " " Amherst, Mass.
" " " Agricultural College, Mich.
" " " St. Anthony Park, St. Paul, Minn.
" " " Agricultural College, Miss.
" " " Columbia, Mo.
" " " Bozeman, Mont.
" " " Lincoln, Nebr.
" " " Reno, Nev.
" " " Durnham, N. H.
" " " New Brunswick, N. J.
" " " Mesilla Park, N. Mex.
" " " Geneva, N. Y.
" " " Ithaca, N. Y.
" " " Raleigh, N. C.
" " " Fargo, N. Dak.
" " " Wooster, Ohio.
" " " Stillwater, Oklahoma.

Agricultural Experiment Station, Corvallis, Oregon.
" " " State College, Pa.
" " " Mayaguez, Porto Rico, W. I.
" " " Kingston, R. I.
" " " Clemson College, S. C.
" " " Brookings, S. Dak.
" " " Knoxville, Tenn.
" " " College Station, Texas.
" " " Logan, Utah.
" " " Burlington, Vt.
" " " Blacksburg, Va.
" " " Morgantown, W. Va.
" " " Pullman, Wash.
" " " Madison, Wis.
" " " Laramie, Wyo.

† Allgemeine Botanische Zeitschrift, Karlsruhe, Germany.

Amani. Biologisch-Landwirtschaftliches Institut, Bezirk Tanga, Deutsch-Ost-Afrika. *Berichte.*

America. Botanical Society of America. *Publications.*

America. Society of American Florists, Boston, Mass. *Proceedings.*

American Academy of Arts and Sciences, Boston, Mass. *Proceedings.*

American Agriculturist, New York City, N. Y.

American Association for the Advancement of Science, Washington, D. C. *Proceedings.*

American Botanist, Binghamton, N. Y.

American Florist, Chicago, Ill.

American Gardening, New York City, N. Y.

American Journal of Pharmacy, Philadelphia, Pa.

American Museum of Natural History, New York City, N. Y. *Bulletin*, *Journal*, *Report.*

‡ American Naturalist, Boston, Mass.

‡ American Philosophical Society, Philadelphia, Pa. *Transactions.*

American Rose Society, New York City, N. Y. *Bulletin.*

† Annales des Sciences Naturelles: Botanique; Paris, France.

Annales Mycologici, Berlin, Germany.

Annali di Botanica: see Rome, R. Istituto Botanico.

‡ Annals of Botany, London, England.

Antwerp. Jardin Botanique, Antwerp, Belgium. *Seed Lists.*
Appalachian Mountain Club, Boston, Mass. *Appalachia.*
Arboriculture: see International Society of Arboriculture.
* Archiv der Pharmazie, Berlin, Germany.
Ardennes. Société d'Histoire Naturelle, Charleville, France. *Bulletin.*
Argentine Republic. Museo de La Plata, Provincia de Buenos Aires. *Anales.*
Argentine Republic. Sociedad Cientifica Argentina, Buenos Aires. *Anales.*
Arkiv för Botanik: see Sweden, Kongliga Svenska Vetenskaps-Akademien.
Asiatic Society of Bengal: see Bengal, Asiatic Society.
Asmara. Ufficio Agrario Sperimentale, Asmara, Colonia Eritrea, N. E. Africa. *Bollettino.*
Association pour la Protection des Plantes, Geneva, Switzerland. *Bulletin.*
Audubon Park: see New Orleans.
Basle. Naturforschende Gesellschaft, Basle, Switzerland. *Verhandlungen.*
Bavaria. Bayerische Gesellschaft zur Erforschung der heimischen Flora, Munich, Bavaria. *Berichte, Mittheilungen.*
* Beiträge zur Wissenschaftlichen Botanik, Stuttgart, Germany.
Belgium. Société Royale de Botanique de Belgique, Brussels, Belgium. *Bulletin.*
Belgrade. Jardin Botanique "Jevremovac," Belgrade, Servia. *Seed Lists.*
Belize. Botanical Garden, Belize, British Honduras, Central America.
Bengal. Asiatic Society of Bengal, Calcutta, India. *Journal.*
Bergianska Trädgården, Stockholm, Sweden. *Acta Horti Bergiani.*
‡ Berlin. Königlicher Botanischer Garten, Berlin, Germany. *Notizblatt.*
Bernice Pauahi Bishop Museum, Honolulu, Hawaii.
† Bibliotheca Botanica, Stuttgart, Germany.
* Biltmore Botanical Studies, Biltmore, N. C.
* Biologisches Centralblatt, Leipzig, Germany.
* Biometrika, London, England.
Bombay. Victoria Gardens, Bombay, India. *Report.*

Boston. Board of Commissioners of Department of Parks, Jamaica Plain, Mass. *Annual Report.*

‡ Boston Society of Natural History, Boston, Mass. *Proceedings.*

Botanical Gazette, Chicago, Ill.

† Botanical Magazine, London, England.

Botanical Society of America: see America, Botanical Society.

† Botanische Jahrbücher, Leipzig, Germany.

† Botanische Zeitung, Leipzig, Germany.

† Botanischer Jahresbericht, Leipzig, Germany.

† Botanisches Centralblatt, Cassel, Germany.

† Botanisches Centralblatt: Beihefte, Cassel, Germany.

‡ Botanisk Tidsskrift: see Copenhagen, Société Botanique.

Botaniste: see Le Botaniste.

Botaniska Notiser, Lund, Sweden.

Brandenburg. Botanischer Verein der Provinz Brandenburg, Berlin, Germany. *Verhandlungen.*

Bremen. Naturwissenschaftlicher Verein, Bremen, Germany, *Abhandlungen.*

Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y. *Memoirs of Natural Science*, *Science Bulletin*, *Children's Museum Bulletin*, *Children's Museum News.*

Brussels. Institut Botanique de l'Université, Brussels, Belgium. *Recueil.*

Brussels. Jardin Botanique de l'État, Brussels, Belgium. *Bulletin.*

* Bryologist, Brooklyn, N. Y.

Bucharest. Institut Botanique, Bucharest, Roumania. *Bulletin de l'Herbier.*

Buenos Aires. Museo de Farmacologia, Buenos Aires, Argentine Republic. *Trabajos.*

Buenos Aires. Museo Nacional, Buenos Aires, Argentine Republic. *Anales.*

Buffalo Botanic Garden, West Seneca, N. Y.

Buffalo Society of Natural Sciences, Buffalo, N. Y. *Bulletin.*

* Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Annales*, *Icones Bogorienses.*

Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Bulletin*, *Mededeelingen*, *Verslag.*

* Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises, Paris, France.

Bulletin of Pharmacy, Detroit, Mich.

Calcutta. Indian Museum, Calcutta, India. *Indian Museum Notes.*

‡ Calcutta. Royal Botanical Gardens, Calcutta, India. *Annals.*

‡ California Academy of Sciences, San Francisco, Calif. *Proceedings.*

California Academy of Sciences, San Francisco, Calif. *Proceedings.*

California Floriculturist, Los Angeles, Calif.

California State Agricultural Society, Sacramento, Calif. *Transactions.*

California State Board of Horticulture, Sacramento, Calif. *Report.*

California. University of California, Berkeley, Calif. *Contributions from the Botanical Seminary, Contributions from the Botanical Laboratory, Seed Lists.*

Canada. Botanical Club of Canada, Halifax, Canada. *Annual Report.*

Canada. Geological and Natural History Survey, Ottawa, Canada. *Contributions from the Herbarium.*

Canada. Report of the Minister of Agriculture, Ottawa, Canada.

‡ Canadian Record of Science, Montreal, Canada.

Carnegie Institution, Washington, D. C. *Yearbook.*

Carnegie Institution: Desert Botanical Laboratory, Tucson, Arizona. *Report.*

Cellule: see La Cellule.

* Centralblatt für Bakteriologie: Abtheilung I, Jena, Germany.

* Centralblatt für Bakteriologie: Abtheilung II, Jena, Germany.

Chicago Hardwood Record, Chicago, Ill.

Chicago. University of Chicago, Chicago, Ill. *Contributions from the Hull Botanical Laboratory.*

Chile. Museo Nacional, Santiago de Chile, Chile. *Anales.*

Christiania. Hortus Botanicus, Christiania, Norway. *Seed Lists.*

Christiania. Physiographiske Forening, Christiania, Norway. *Nyt Magazin for Naturvidenskaberne.*

Christiania. Videnskabs-Selskabet, Christiania, Norway. *Skrifter.*

Cincinnati. Botanical Gardens, Cincinnati, Ohio.

Cincinnati Society of Natural History, Cincinnati, Ohio. *Journal.*

Clara Leigh Dwight Gardens, Mount Holyoke College, Mass. *Seed Lists.*

Colorado State Board of Agriculture, Denver, Colo. *Annual Report.*

Colorado. University of Colorado, Boulder, Colo. *Studies.*

Columbia University, New York City, N. Y. *Contributions from the Department of Botany, Memoirs of the Department of Botany.*

‡ Columbus Horticultural Society, Columbus, Ohio. *Journal.*

Connecticut Academy of Arts and Sciences, New Haven, Conn. *Transactions.*

Connecticut State Board of Agriculture, Hartford, Conn. *Annual Report.*

‡ Copenhagen. Société Botanique, Copenhagen, Denmark. *Botanisk Tidsskrift.*

Costa-Rica. Instituto Fisico-geografico, San José de Costa Rica. *Boletin.*

Country Life in America, Ithaca, N. Y.

Cuba. Estación Central Agronómica, Santiago de las Vegas, Cuba, W. I. *Circular.*

Curtis' Botanical Magazine: see Botanical Magazine.

Davenport Academy of Sciences, Davenport, Ia. *Proceedings.*

Denison University, Granville, Ohio. *Bulletin of the Scientific Laboratories.*

Desert Botanical Laboratory: see Carnegie Institution, Desert Botanical Laboratory.

† Deutsche Botanische Gesellschaft, Berlin, Germany. *Berichte.*

‡ Deutsche Botanische Monatsschrift, Arnstadt, Germany.

Deutsche Dendrologische Gesellschaft, Poppelsdorf bei Bonn, Germany. *Mitteilungen.*

Dorpat: see Jurjeff.

Dublany. Hortus Botanicus Academicus: see Lemberg, Hortus Botanicus.

Dublin. Botanic Gardens of the Royal Dublin Society, Glasnevin, Dublin, Ireland. *Seed Lists.*

‡ Edinburgh Botanical Society, Edinburgh, Scotland. *Transactions.*

Edinburgh. Royal Botanic Garden, Edinburgh, Scotland. *Seed Lists.*

Eli Lilly and Company, Indianapolis, Ind.

Elisha Mitchell Scientific Society, Chapel Hill, N. C. *Journal.*

Eritrea: see Asmara.

Fauna: see Luxemburg, Société des Naturalistes Luxembourgeois.

Feuille des Jeunes Naturalistes, Paris, France.

Field Columbian Museum, Chicago, Ill. *Publications—Botanical Series, Report Series.*

† Flora, Marburg, Germany.

* Flora and Sylva, London, England.

Floral Life, Philadelphia, Pa.

Florence. R. Orto Botanico, Florence, Italy. *Lavori.*

Florida. Report of the Commissioner of Agriculture, Jacksonville, Fla.

Florida State Horticultural Society, Tallahassee, Fla. *Proceedings.*

Florists' Exchange, New York City, N. Y.

Forestry and Irrigation, Washington, D. C.

Forestry Quarterly, Ithaca, N. Y.

† France. Société Botanique de France, Paris, France. *Bulletin.*

† France. Société Mycologique de France, Paris, France. *Bulletin.*

‡ Frankfort on Oder. Naturwissenschaftlicher Verein des Regierungsbezirkes, Frankfurt a/O., Germany. *Helios.*

† Garden, London, England.

† Gardener's Chronicle, London, England.

Gardening, Chicago, Ill.

* Gartenflora, Munich, Bavaria, Germany.

* Gartenkunst, Berlin, Germany.

Geneva. Jardin d'Acclimatation Alpin, Geneva, Switzerland. *Seed Lists.*

Geneva. Jardin Botanique de Genève, Geneva, Switzerland. *Bulletin du Laboratoire Général, Annuaire.*

Georgia State Historical Society, Augusta, Ga. *Proceedings.*

Gray Herbarium: see Harvard University.

Groningen. Jardin Botanique de l'Université, Groningen, Holland. *Seed Lists.*

Hamburg. Naturwissenschaftlicher Verein, Hamburg, Germany. *Verhandlungen, Botanical papers from the Abhandlungen.*

Hamburgische Botanische Staatsinstitute, Hamburg, Germany. *Seed Lists.*

Hamilton Scientific Association, Hamilton, Ontario. *Journal and Proceedings.*

Harvard University, Cambridge, Mass. *Contributions from the Gray Herbarium, Contributions from the Cryptogamic Laboratory.*

Havana. Jardin Botanico de la Universidad, Havana, Cuba.

‡ Hedwigia, Dresden, Germany.

Helios: see Frankfort on Oder, Naturwissenschaftlicher Verein.

Hérault. Société d'Horticulture et d'Histoire Naturelle de l'Hérault, Montpellier, France. *Annales.*

Herbier Boissier, Geneva, Switzerland. *Bulletin.*

Holland. Société Botanique Néerlandaise, Nijmegen, Holland. *Nederlandsch Kruidkundig Archief, Verslagen en Mededelingen, Travaux de botanique.*

Hooker's Icones Plantarum: see Icones Plantarum.

Hopkins Seaside Laboratory: see Leland Stanford Jr. University.

Hortus Thenensis; see Tirlemont.

* House and Garden, Philadelphia, Pa.

Hull Botanical Laboratory: see Chicago, University.

‡ Icones Plantarum, London, England.

Icones Selectae Horti Thenensis: see Tirlemont.

Illinois Farmer's Institute, Springfield, Ill. *Annual Report.*

Illinois State Department of Agriculture, Springfield, Ill. *Transactions.*

Illinois State Laboratory of Natural History, Urbana, Ill. *Bulletin.*

India. Botanical Survey of India, Calcutta, India. *Records.*

India Rubber World, New York City, N. Y.

Indian Museum Notes: see Calcutta, Indian Museum.

Indiana Academy of Science, Indianapolis, Ind. *Proceedings.*

Indiana Horticultural Society, Indianapolis, Ind. *Transactions.*

International Society of Arboriculture, Connersville, Ind. *Arboriculture.*

Iowa Academy of Sciences, Des Moines, Ia. *Proceedings.*

Iowa Department of Agriculture, Des Moines, Ia. *Yearbook.*

Iowa Park and Forestry Association, Iowa City, Ia. *Proceedings.*

Iowa State College of Agriculture and Mechanic Arts, Ames, Ia. *Contributions from the Botanical Department.*

Iowa State Horticultural Society, Des Moines, Ia. *Transactions.*

Iowa State University, Iowa City, Ia. *Bulletin of the Natural History Laboratories.*

Italia Orticola, Naples, Italy.

‡ Italy. Società Botanica Italiana, Florence, Italy. *Bullettino, Nuovo Giornale Botanico Italiano, Bullettino Bibliografico.*

Jamaica. Public Gardens and Plantations, Kingston, Jamaica. *Bulletin of the Department of Agriculture.*

† Jahrbücher für Wissenschaftliche Botanik, Leipzig, Germany.

* Jahresbericht der Vereinigung der Vertreter der Angewandten Botanik, Berlin, Germany.

† Jahresbericht über die Fortschritte in der Lehre von den Pathogenen Mikroorganismen, Leipzig, Germany.

Jardin Colonial: see Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises.

Java. Proefstation voor Suikerriet in West Java, Dutch East Indies. *Mededeelingen.*

"Jevremovac": see Belgrade, Jardin Botanique "Jevremovac."

Johns Hopkins University, Baltimore, Md. *Circulars.*

* Journal d'Agriculture Tropicale, Paris, France.

† Journal de Botanique, Paris, France.

‡ Journal of Botany British and Foreign, London, England.

Journal of Geography, Columbia University, New York, N. Y.

Journal of Mycology, Columbus, Ohio.

Journal of Pharmacology, New York, N. Y.

Jurjeff. University, Jurjeff (Dorpat), Russia. *Acta Horti Botanici.*

Kansas Academy of Sciences, Topeka, Kans. *Transactions.*

Kansas University Science Bulletin, Lawrence, Kans.

Karlsruhe. Botanischer Garten der Technischen Hochschule, Karlsruhe, Germany. *Seed Lists.*

Kew. Royal Gardens, Kew, England. *Bulletin of Miscellaneous Information.*

* La Cellule, Lierre, France.

La Naturaleza: see Mexico, Sociedad Mexicana de Historia Natural.

Landshut. Botanischer Verein, Landshut, Bavaria, Germany. *Berichte.*

* Le Botaniste, Poitiers, France.

Leland Stanford Jr. University: Hopkins Seaside Laboratory, San Francisco, Calif. *Contributions.*

Lemberg. Hortus Botanicus Academicus Dublanensis, Lemberg, Austria. *Seed Lists.*

Leyden. Ryks Herbarium, Leyden, Holland. *Annales du Musée.*

Leyden. University Botanic Garden, Leyden, Holland. *Seed Lists.*

Liège. Institut Botanique de l'Université, Liège, Belgium. *Archives.*

* Lindenia, Brussels, Belgium.

† Linnean Society, London, England. *Transactions: Botany, Journal: Botany.*

Lloyd Mycological Museum, Cincinnati, Ohio. *Report, Mycological Notes, Reproduction Series, Bulletin.*

* London. Royal Horticultural Society, London, England. *Journal.*

‡ London. Royal Microscopical Society, London, England. *Journal.*

Lund. Hortus Botanicus, Lund, Sweden. *Seed Lists.*

Luxemburg. Société Botanique du Grand Duché de Luxembourg, Luxembourg, Gd. Duché de Luxembourg. *Recueil.*

Luxemburg. Société des Naturalistes Luxembourgeois, Luxembourg, Gd. Duché de Luxembourg. *Fauna.*

Lyons. Jardin Botanique de la Faculté Mixte de Medecine et de Pharmacie, Lyons, France. *Seed Lists.*

Lyons. Jardin Botanique de la Ville, Lyons, France. *Seed Lists.*

‡ Lyons. Société Botanique de Lyon, Lyons, France. *Annales.*

McGill University, Montreal, Canada. *Papers from the Department of Botany.*

Macon. Société d'Histoire Naturelle, Macon, France. *Bulletin.*

Magyar Botanikai Lapok, Budapest, Hungary.

Maine. Report of the Agricultural Commissioner, Augusta, Me.

Malay Peninsula. Agricultural Bulletin of the Malay Peninsula, Singapore, Straits Settlements.

† Malpighia, Genoa, Italy.

Manchester Institute of Arts and Sciences, Manchester, N. H. *Proceedings, Nature Study.*

Manchester Museum, Owens College, Manchester, England. *Reports, Publications.*

Marseilles. Institut Colonial, Marseilles, France. *Annales.*

Maryland. Geological and Natural History Survey, Baltimore, Md.

Massachusetts Horticultural Society, Boston, Mass. *Transactions.*

Massachusetts State Board of Agriculture, Boston, Mass. *Annual Report.*

Mayflower, Floral Park, Long Island, N. Y.

Mazama, Portland, Oregon.

Mexico. Instituto Medico Nacional, Mexico, Mexico. *Anales.*

Mexico. Sociedad Mexicana de Historia Natural, Mexico, Mexico. *La Naturaleza.*

Michigan Academy of Science, Ann Arbor, Mich. *Report.*

Michigan Horticultural Society, Lansing, Mich. *Annual Report.*

Michigan. Report of the Secretary of State relating to Farms and Farm Products, Lansing, Mich.

Michigan State Farmer's Institutes, Agricultural College, Mich. *Bulletin.*

Minnesota. Geological and Natural History Survey, Minneapolis, Minn. *Bulletin, Report.*

Minnesota Horticultural Society, Minneapolis, Minn. *Transactions.*

‡ Minnesota Horticulturist, Minneapolis, Minn.

Miramichi. Natural History Association of Miramichi, Chatham, N. B. *Proceedings.*

Missouri Botanical Garden, St. Louis, Mo. *Report.*

Missouri State Fruit Experiment Station, Mountain Grove, Mo. *Bulletin, Report.*

Missouri State Horticultural Society, Jefferson City, Mo. *Annual Report.*

Modena. R. Orto Botanico, Modena, Italy. *Seed Lists.*

† Monatsschrift für Kakteenkunde, Neudamm, Germany.

Montana. University of Montana, Missoula, Mont. *Bulletin: Biological Series.*

Montevideo. Museo Nacional, Montevideo, Uruguay. *Anales.*

Montpellier. Institut de Botanique, Montpellier. *Seed Lists.*

Moscow. Institut Agronomique, Moscow, Russia. *Annales.*

Moscow. Société Impériale des Naturalistes, Moscow, Russia. *Bulletin.*

Muhlenbergia, Los Gatos, Calif.

Munich. Königlicher Botanischer Garten, Munich, Bavaria. *Seed Lists.*

Musée Teyler, Haarlem, Holland. *Archives.*

Naturalist (The), Hull, England.

Naturaleza: see Mexico, Sociedad Mexicana de Historia Natural.

* Nature, London, England.

Nature Notes: The Magazine of the Selborne Society, London, England.

Nebraska State Horticultural Society, Lincoln, Neb. *Annual Report.*

Nebraska. University of Nebraska, Lincoln, Neb. *Contributions from the Botanical Department.*

Nederlandsch Kruidkundig Archief: see Holland, Société Botanique Néerlandaise.

New Brunswick. Natural History Society of New Brunswick, St. John, N. B., Canada. *Bulletin.*

New England Botanical Club: see Rhodora.

New Hampshire. Board of Agriculture, Manchester, N. H. *Annual Report.*

New Jersey State Board of Agriculture, Trenton, N. J. *Annual Report.*

New Jersey State Horticultural Society, Trenton, N. J. *Proceedings.*

New Orleans. Audubon Park, New Orleans, La. *Yearbook.*

* New Phytologist, London, England.

New York Academy of Sciences, New York, N. Y. *Annals.*

New York Farmers, New York, N. Y. *Proceedings.*

New York Horticultural Society, New York, N. Y. *Report, Memoirs.*

New York Public Library, New York, N. Y. *Bulletin.*

New York State Department of Agriculture, Albany, N. Y. *Annual Report.*

New York State Museum of Natural History, Albany, N. Y. *Annual Report.*

New York Zoölogical Society, New York, N. Y. *Report, News Bulletin.*

Nova Scotia. Secretary for Agriculture, Halifax, N. S., Canada. *Annual Report.*

Nova Scotian Institute of Science, Halifax, Canada. *Proceedings, Transactions.*

Nuova Notarisia, Padua, Italy.

Nuovo Giornale Botanico Italiano: see Italy, Società Botanica Italiana.

Nürnberg. Naturhistorische Gesellschaft, Nürnberg, Germany. *Abhandlungen.*

Nyt Magazin: see Christiania, Physiographiske Forening.

Oberlin College, Oberlin, Ohio. *Laboratory Bulletin.*

Ohio Mycological Bulletin: see Ohio State University.

Ohio Naturalist: see Ohio State University, Biological Club.

Ohio State Board of Agriculture, Columbus, Ohio. *Annual Report.*

Ohio State University, Columbus, Ohio. *Bulletin: Botanical Series, Ohio Mycological Bulletin.*

Ohio State University: Biological Club, Columbus, Ohio. *Ohio Naturalist.*

* Orchid Review, London, England.

Oregon State Board of Horticulture, Salem, Oregon. *Report.*

† Österreichische Botanische Zeitschrift, Vienna, Austria.

Ottawa. Central Experiment Farm, Ottawa, Canada. *Bulletin, Report.*

Ottawa Naturalist, Ottawa, Canada.

Palermo. R. Istituto ed Orto Botanico, Palermo, Italy. *Bollettino; Contribuzioni alla Biologia Vegetale.*

Paris. Muséum d'Histoire Naturelle, Paris, France. *Bulletin.*

Paris. Société Linnéenne de Paris, Paris, France. *Bulletin Mensuel.*

Park and Cemetery, Chicago, Ill.

Pennsylvania Botanical Society, Philadelphia, Pa. *Proceedings.*

Pennsylvania Department of Forestry, Harrisburg, Pa. *Report.*

Pennsylvania Forestry Association, Philadelphia, Pa. *Forest Leaves.*

Pennsylvania. University of Pennsylvania, Philadelphia, Pa. *Contributions from the Department of Botany.*

Peradeniya. Royal Botanic Gardens, Peradeniya, Ceylon. *Annals.*

‡ Pharmaceutical Archives, Milwaukee, Wis.

Pharmaceutical Record, New York City, N. Y.

Pharmaceutical Review, Milwaukee, Wis.

Philadelphia. Academy of Natural Sciences, Philadelphia, Pa. *Proceedings.*

Philadelphia Commercial Museum, Philadelphia, Pa. *Publications.*

Philadelphia. Geographical Society, Philadelphia, Pa. *Bulletin.*

Philippine Islands. Bureau of Agriculture, Manila, Philippine Ids. *Report, Bulletin, Farmers Bulletin, Press Bulletin.*

Philippine Islands. Bureau of Government Laboratories, Manila, Philippine Ids. *Publications.*

‡ Pittonia, Washington, D. C.

Plant World, Washington, D. C.

Popular Science Monthly, New York City, N. Y.

Portici. R. Scuola Superiore di Agricoltura, Portici, Italy. *Annali.*

Portland Society of Natural History, Portland, Me. *Proceedings.*

Preservation of Native Plants: see Society for the Preservation of Native Plants.

Queens College Library, Kingston, Ontario, Canada.

Regensburg. Kgl. Botanische Gesellschaft, Regensburg, Bavaria, Germany. *Denkschriften.*

Revue Bryologique, Cahan, Athis, France.

* Revue de Botanique Systématique et de Géographie Botanique, Asnières, France.

Revue de l'Horticulture Belge et Etrangère, Ghent, Belgium.

Revue des Cultures Coloniales, Paris, France.

† Revue Générale de Botanique, Paris, France.

* Revue Horticole, Paris, France.

‡ Revue Mycologique, Toulouse, France.

Revue Scientifique du Bourbonnais et du Centre de la France, Moulins, France.

* Rhodora, Boston, Mass.

Rome. R. Istituto Botanico, Rome, Italy. *Annuario; Annali di Botanica.*

Rome. R. Stazione Agraria Sperimentale, Rome, Italy. *Bolletino.*

Rochester Academy of Sciences, Rochester, N. Y. *Proceedings.*

Royal Gardens, Kew: see Kew, Royal Gardens.

Royal Horticultural Society: see London, Royal Horticultural Society.

Royal Microscopical Society: see London, Royal Microscopical Society.

Rural New Yorker, New York City, N. Y.

St. Louis. Academy of Science, St. Louis, Mo. *Transactions.*

St. Petersburg. Académie Impériale des Sciences, St. Petersburg, Russia. *Travaux du Musée Botanique.*

St. Petersburg. Institut et Jardin Botanique de l'Université Impériale, St. Petersburg, Russia. *Scripta Botanica, Seed Lists.*

† St. Petersburg. Jardin Impérial Botanique, St. Petersburg, Russia. *Acta, Bulletin, Seed Lists.*

Santa Barbara Society of Natural History, Santa Barbara, Calif. *Bulletin.*

Santiago de Chile: see Chile, Museo Nacional.

Saone-et-Loire. Société des Sciences Naturelles de Saone-et-Loire, Chalon-sur-Saone, France. *Bulletin.*

Scafati. R. Istituto Sperimentale di Scafati, Salerno, Italy. *Bollettino Tecnico.*

Schweizerische Botanische Gesellschaft, Bern, Switzerland. *Berichte.*

Science, New York City, N. Y.

Scientific Roll, London, England.

Selborne Society: see Nature Notes.

Sharon Biological Laboratory, Sharon, Mass.

Shaw School of Botany: see Washington University.

Siena. R. Orto Botanico, Siena, Italy. *Bullettino.*

Singapore. Botanic Gardens, Singapore, Straits Settlements. *Annual Report.*

Smith College, Northampton, Mass. *Seed Lists.*

Smithsonian Institution, United States National Museum, Washington, D. C. *Report.*

Sociedad Broteriana, Jardim Botanico, Coimbra, Portugal. *Boletim.*

Society of American Florists: see America.

Society for Plant Morphology. *Publications.*

Society for the Preservation of Native Plants, Boston, Mass. *Leaflets.*

* Society for the Promotion of Agricultural Science. *Proceedings.*

Southern California Academy of Sciences, Los Angeles, Cal. *Bulletin.*

Springfield. Pleasure Driveway and Park District, Springfield, Ill. *Annual Report.*

Staten Island. Natural Science Association of Staten Island, New Brighton, S. I., N. Y. *Proceedings.*

Stockholm. Bergianska Trädgården: see Bergianska Trädgården.

Stockholm. Kongliga Vetenskaps-Akademien: see Sweden.

Stockholm. Högskolas Botaniska Institut, Stockholm, Sweden. *Meddelanden.*

Sweden. Kongliga Svenska Vetenskaps-Akademien, Stockholm, Sweden. *Arkiv för Botanik.*

Swanley. Horticultural College, Swanley, England. *Report.*

Sydney. Botanic Gardens, Sydney, New South Wales. *Report.*

Sydney. Technological Museum, Sydney, New South Wales. *Publications.*

Texas Academy of Science, Austin, Texas. *Transactions.*

Texas. University of Texas, Austin, Texas. *Contributions from the Botanical Laboratory.*

Thüringischer Botanischer Verein, Weimar, Germany. *Mittheilungen.*

Tiflis. Jardin Botanique, Tiflis, Russia. *Travaux.*

Tirlemont. Hortus Thenensis, Tirlemont, Belgium. *Icones Selectae; Plantae Novae.*

Tōkyō Botanical Society, Tōkyō, Japan. *Botanical Magazine.*

Tōkyō. Imperial University, Botanic Garden, Tōkyō, Japan. *Seed Lists.*

Toronto. University of Toronto, Toronto, Canada. *Studies, Biological Series.*

Torrey Botanical Club, New York City, N. Y. *Bulletin, Memoirs, Torreya.*

Trajectum: see Utrecht.

Triest. Museo Civico di Storia Naturale Ferdinando Massimiliano, Triest, Austria. *Seed Lists.*

‡ Trinidad. Royal Botanic Gardens, Trinidad, W. I. *Bulletin of Miscellaneous Information.*

Tromsø Museum, Tromsø, Norway. *Aarshefter.*

United States Department of Agriculture, Washington, D. C. *All publications.*

United States Department of State, Washington, D. C. *Publications of the Bureau of Foreign Commerce.*

United States Geological Survey, Washington, D. C. *Annual Report; Bulletin; Monographs; Professional Papers.*

United States National Museum: see Smithsonian Institution, United States National Museum.

Upsala. Kgl. Universität, Upsala, Sweden. *Botanical reprints, Seed Lists.*

Utrecht. Hortus Botanicus Universitatis Rheno-Traiectinae, Utrecht, Holland. *Seed Lists.*

Valais. La Murithienne, Société Valaisanne des Sciences Naturelles, Sion, Valais, Switzerland. *Bulletin.*

Vermont State Board of Agriculture, Burlington, Vt. *Annual Report.*

Vick's Illustrated Monthly Magazine, Rochester, N. Y.

* Vienna. K. K. Zoölogisch-Botanische Gesellschaft, Vienna, Austria. *Abhandlungen.*

‡ Vienna. K. K. Zoölogisch-Botanische Gesellschaft, Vienna, Austria. *Verhandlungen.*

Virginia. Department of Agriculture, Richmond, Va. *Annual Report.*

Wageningue. Ecoles Moyenne et Supérieure d'Horticulture de l'Etat, Wageningue, Holland. *Seed Lists.*

Warsaw. Jardin Botanique, Warsaw, Poland, Russia. *Seed Lists.*

Washington Academy of Sciences, Washington, D.C. *Proceedings.*

Washington. Biological Society of Washington, Washington, D. C. *Proceedings.*

Washington. Library of Congress, Washington, D.C.

Washington. National Botanic Garden, Washington, D.C.

Washington University, St. Louis, Mo. *Contributions from the Shaw School of Botany.*

West American Scientist, San Diego, Calif.

West Indies. Agricultural Department, Barbadoes, W. I. *Bulletin, Agricultural News.*

West Java. Proefstation voor Suikerriet: see Java, Proefstation.

Wild Flower Preservation Society of America, Washington, D. C. *Circulars.*

Wisconsin Academy of Arts and Sciences, Madison, Wis. *Transactions.*

Wisconsin Natural History Society, Milwaukee Public Museum, Milwaukee, Wis. *Proceedings.*

Wisconsin. University of Wisconsin, Madison, Wis. *Bulletin.*

† Zeitschrift für Pflanzenkrankheiten, Stuttgart, Germany.

Zeitschrift für Physiologische Chemie, Strassburg, Germany.

* Zeitschrift für Wissenschaftliche Mikroskopie, Braunschweig, Germany.

Zoë, San Diego, Calif.

Zürich. Naturforschende Gesellschaft, Zürich, Switzerland. *Vierteljahrsschrift.*

REPORT OF THE HEAD GARDENER

To the Director-in-Chief.

Sir: I have the honor to submit herewith my report as Head Gardener for the year 1904.

Systematic Plantations

Herbaceous Grounds. No marked changes in arrangement have been effected here. Two gardeners and one laborer, with a third laborer for a part of the time, have carried on the gardening work; this same force has also attended to the circles around the trees in the pinetum in the immediate vicinity, to the beds in the viticetum, and to those of the morphological garden.

There are now represented in this collection, including those at the nurseries, 2,859 species and varieties, a slight decrease from the number reported last year. Owing to the severe weather of last winter and the forming of an extensive ice-crust on the lower parts of the grounds, the mortality among these plants was greater than usual. It was possible to replace some of the species from the duplicate collection at the nurseries, but in some cases this could not be done.

Considerable difficulty was experienced during the year with the data labels. In several instances all the labels in a bed were pulled completely out of the ground and thrown into heaps. These labels are not easily removed, so it must have required the strength of more than a mere child to accomplish it.

Morphological Garden. The completion of the brook in this area has made possible the planting of a number of aquatic plants, thus considerably increasing the usefulness of this collection. There have been added here the past season 62 species, making a total now in the collection of 125 species.

Fruticetum. To the collections here installed there were added, in great part by transferral from the nurseries, 48

species and 101 plants. There are still others in the nursery awaiting transplanting, mainly representatives of the heath and related families. It was thought advisable not to attempt to assemble in the fruticetum the plants representing these families, but to wait before doing this until such time as a restudy could be made of the region in the vicinity of the Scott Avenue bridge, where it was originally planned to place them. The construction work on this bridge during the summer required the temporary removal of some of the plants in that neighborhood; these were placed for the time being in a position not distant, so that they can readily be placed in their correct position as soon as opportunity presents.

The unusual cold of the past winter resulted in the killing of some of the shrubs, and the destruction of many others back to the snow line. A detailed account of this damage was made the subject of an article in the July number of the Garden Journal. It was possible to replace from duplicate material most of the shrubs killed, and those which were harmed only to the snow line have made a rapid recovery.

There are now in this collection, including those at the nurseries, 692 species and varieties; in the fruticetum itself there are 1,046 shrubs.

Two laborers have done the gardening work here, as well as that of the salicetum in the immediate vicinity, including such hand-mowing as was necessary.

Salicetum. The collection of willows and poplars in the north meadow includes 51 species and 121 plants. During the year there have been 23 species and 33 plants transplanted from the nursery to this collection.

Deciduous Arboretum. The collection of deciduous trees now embraces, including those native to the tract and others in the nurseries as yet too small to transplant, 265 species. The planted trees in this collection number 384. Of these 46 species and 111 trees were put in position during the past spring.

Part of the time of one man has been required to do such work as is at present necessary in this area.

Pinetum. The unusual and continued cold weather of the past winter, following the long drought of the previous summer, was most disastrous to many conifers — some of those meeting disaster having been considered hardy in this latitude. The loss in the Garden collection, however, has proved considerably less than that reported from other sections. The loss, with little exception, has been replaced with material transplanted from the nurseries, or with other plants of the same species secured from Mr. Lowell M. Palmer, who gave so largely to the collection the previous year.

In the pinetum collection there are 251 species and varieties, including those at the nurseries; of these 46 were put in place the past spring. In the pinetum itself there are 504 trees, 87 of which were planted this season.

The gardening operations here occupied part of the time of three men.

Viticetum. This collection contains 37 species and 59 plants. As stated above, the gardening work here was performed by the force employed in the herbaceous grounds, the present undeveloped condition of the viticetum collection permitting of this.

Conservatories

With the exception of the temperate collections, one group of tropical plants, and a portion of the cacti, the arrangement of the collections here installed remains as it was last year.

The temperate collections were previously located in houses nos. 12 and 13. The growth, both in size of individual plants and the number of species represented, had resulted in so much crowding, that it became necessary to furnish considerably more space for these collections. To provide this space, it was decided to devote to the temperate collections house no. 14 also, which had previously been given up to a group of tropical plants. This necessitated the removal to other quarters of the plants in this house, and room was provided for them in house no. 8, thus bringing

them in close connection with the remainder of the tropical plants. This has proved a decided advantage, as was anticipated, as it not only greatly facilitates the study of these plants, but also simplifies the work of their culture. This procedure required the rearrangement of the plants in houses nos. 7 and 8, and also necessitated the removal of a number of individuals, that room might be made for the additions. The larger specimens, which it was desirable to retain, were removed to house no. 4, and the number of specimens of each remaining species was reduced to two individuals, the lowest number permissible to safeguard the collections. The duplicate material was either disposed of by exchange, or, in the case of common species, destroyed. Even with this thinning out the collections in nos. 7 and 8 are too crowded, and more room for them will soon be required.

There are now, therefore, three houses devoted to the temperate collections, viz.: nos. 12, 13 and 14. The collection of plants for study purposes, arranged according to the Engler and Prantl sequence of families, which was formerly confined to house no. 12, has now been extended to include house no. 14; the cryptogams, endogenous plants and the exogenous plants up to the Myrtiflorae are in house no. 12; the remainder, from and including the Myrtiflorae, have been removed to house no. 14, the sequence beginning with the east end of the north bench, and terminating at the east end of the south bench. House no. 13, as is the case with house no. 4 for the tropical plants, is now devoted to such material as is too large for proper accommodation on the benches in the other houses. From the shape of this house it was not possible to follow so rigidly the botanical sequence adopted in the study collection, where it is planned to represent as many families and genera as possible. The grouping by families is adhered to, however, and the families themselves are grouped as much as possible in the larger divisions. The endogenous plants are located in a portion of the northwest and southwest corners, the amaryllis family in the former, and the grass, sedge and lily families in the latter. The

pine and yew families are confined to the westerly side of the center portion, and the Gamopetalae to the northern side of the center and to a portion of the northwest corner immediately opposite. The remainder of the house is devoted to the exogenous plants not enumerated above, with the big group of the mimosa family on the easterly side of the house.

This rearrangement has made possible a greater representation of families, genera and species in the study collection already referred to in houses nos. 12 and 14, thus greatly emphasizing its usefulness to students.

To facilitate the study of the cactus family, such portions of the genus *Opuntia*, as had formerly been in house no. 6, were transferred to house no. 5, thus bringing all the smaller specimens of this family on the center bench of that house. To accomplish this it was necessary to remove the mesembryanthemums, fleshy euphorbias, bromeliads, and a few small families to house no. 6.

There are now in the conservatory collections, including species temporarily at the propagating houses, 7,038 species and varieties. The collections in the conservatories alone number 11,200 plants, distributed as follows:

House No.	1	394	
"	2	635	
"	3	336	
"	4	425	
"	5	2,169	
"	6	700	
"	7	764	
"	8	797	
House No.	9	330	
"	10	688	
"	11	435	
"	12	1,012	
"	13	659	
"	14	764	
"	15	1,092	

In my report of last year I referred to the then crowded condition of the conservatories. This condition has in no wise been ameliorated, even though many plants have been withdrawn from these collections. Last year there were 12,-921 plants, while now there are 11,200, a decrease of 1,721. This decrease and the resultant space thereby acquired has been surpassed by the increased demand for space to accommodate the remaining plants, which are constantly increasing

in size. I would therefore emphasize my remarks of last year in regard to the crowded condition of the conservatories, and make a request for more houses for the accommodation of the collections. As there are 7,038 species already, it may be seen that a space capacity for 11,200 plants will not accommodate two individuals of each species, and as stated above, this is the lowest number permissible to safeguard the integrity of the collections. At the propagating houses there are now a considerable number of plants awaiting transferral; these cannot long be accommodated there, as the space is needed for purely experimental and cultural operations.

At present a number of collections of small plants are being grown in the large houses at the conservatories, more suitable accommodations not being at present available. Such plants require for their best culture special conditions which it is difficult if not impossible to provide adequately in their present quarters. To attempt to create the humid and hot conditions required for these plants in large houses with great unoccupied areas above the plants greatly adds to the cost of maintenance. What is needed for such collections is houses of low construction, where the space to be controlled as to humidity and heat need be but one half or one third as great as in the large houses; such houses also do not furnish opportunities for draughts, which are very inimical to certain plants of a tropical habitat. Houses of this character are, of course, of much cheaper construction than those which go to make up the conservatory range.

As examples of collections which could be better and more economically grown in this style of house, I would refer to the tropical ferns in house no. 10, the orchids in houses nos. 12 and 15, the pitcher-plants, aroids and bromeliads in house no. 2, and the greater part of the contents of house no. 3. If other quarters could be provided for the contents of these houses, a considerable area would become available for the larger plants which can be more readily grown in such houses as form the conservatory range.

Propagating Houses and Nurseries

The increased activity of the experimental work being prosecuted in this part of the institution, and the attendant demand for more land for this purpose, made it necessary to take under cultivation considerably more area than formerly. The continued work of exploration in the American tropics and warmer temperate regions has brought in many additional species — species which could not be secured from any other source — so that the propagating houses are kept constantly filled with the results of these expeditions. The completion of the two additional houses has furnished more ample and much needed facilities for this work, as it gives additional room to devote to plants which require special treatment. The range of pits and the cellar under the new houses have greatly added to the facilities for the wintering of such plants as require but slight protection from the cold.

Packets of seed to the number of 1,174 have been sown, from which have been derived, up to the present time, 2,761 plants. There are now in the propagating houses, not including the experimental house under the control of Dr. MacDougal, 8,438 plants. In the nurseries there are 2,345 trees and shrubs and about 1,200 specimens of herbaceous plants.

Labeling, Recording and Herbarium

In this department have been employed one garden aid and an average of about two apprentices. The garden aid has been employed for the greater part of his time in making herbarium specimens and in drying and mounting these; he has also been of great assistance to me in checking up and correcting data labels. The two apprentices have been employed in the recording of plants and seeds, the writing of data labels, and the manufacture, preparation and lettering of show labels.

Show labels to the number of 1,799 have been made for the conservatories, 54 for the trees, and for the herbaceous grounds 397, making a total of 2,250.

The tree labels referred to above are of a new design. The zinc label designed for this purpose with black letters, which has been in use in the Garden for several years, has met the requirements of a tree label better than any previously seen. It was lacking in certain requisites, however, and it had been my desire for some time to experiment along the line of a new tree label. Miss Elizabeth Billings, a Garden member, who was also one of our students, learning of this desire on my part, kindly offered to defray the expenses of such experimentation. These experiments have been going on during the summer, and the resulting product, embodied in the labels referred to, promises to be a distinct gain over any label for this purpose with which I am familiar. The basis of the label is sheet lead. In this the letters are impressed with steel dies, and the impressions filled up with white lead paint. The first cost of manufacturing these is greater than that of the zinc labels previously used, but they promise to be much more lasting. This label also presents a much neater and more elegant appearance, the lettering is more legible, and the label itself at a distance dissolves into the general color of the landscape.

Accessions numbers 19,938 to 21,949, inclusive, have been registered during the year, making a total of 2,012 accessions. The total number of plants received from all sources has been 5,617, of which 476 were purchased, 641 donated, 1,142 collected, 597 acquired by exchange, and 2,761 derived from seeds.

The herbarium of cultivated plants has been increased by 2,555 specimens; these have been mounted. The drying and mounting, a work hitherto done by the museum aids, was performed this year by a garden aid, considerably adding to the work of this department.

Size of the Collections

The following table gives the approximate number of species and individuals in each collection, and the total number, both wild and cultivated, growing within the grounds:

Conservatories	7,038
Herbaceous Grounds	2,859
Fruticetum	692
Deciduous Arboretum	265
Pinetum	251
Salicetum	51
Viticetum	37
Wild Flora	860
	12,053

The number last year was 11,602, making a gain of 451.

General Horticultural Operations

This work has been prosecuted under the immediate direction of Mr. George A. Skene, second gardener. For the accomplishment of this work there have been available : one foreman-gardener, eighteen gardeners, seven apprentices, and an equivalent of eleven laborers. In addition to the above one driver for his entire time and two during the mowing season were detailed to this department for the purposes of hauling and mowing.

Of this force one foreman-gardener, nine gardeners, and six apprentices (of which one has charge of the cellar) are detailed to the conservatories; three gardeners and one apprentice to the propagating houses; and six gardeners and eleven laborers to the outside work. Of this out-door force, two gardeners and one laborer, with a third laborer for a part of the time, were detailed to the herbaceous grounds; two laborers to the fruticetum; one laborer to the arboretum for part of his time; two gardeners and four laborers to the hand-mowing and raking of the lawns; one gardener and one laborer for a part of his time to scythe-mowing; and one gardener and two laborers to the care of the decorative shrubbery, trees, west border, and the pinetum, with the exception of that portion of it in the immediate neighborhood of the herbaceous grounds. Late in the fall the laborers were withdrawn, as well as two of the gardeners, and the necessary work continued with the reduced force.

The planting was purposely confined to the systematic collections, very little ornamental planting being attempted. The shrubbery border between the service road and the walk, south of the conservatories, was completed; the shrubs for this purpose were secured by purchase, or from other decorative plantations where such material could be spared. The beds around the driveway fountain were planted with the usual decorative plants, and the urns on the tops of the pillars were supplied with the usual agaves.

Personal Investigations

On October 5 I was granted leave of absence, in order to proceed, accompanied by an assistant, to Inagua to make a collection in that little-known region. We spent four weeks there, arriving again in New York on November 11. It was a highly interesting experience, and resulted in a gain to the Garden of over 1,000 herbarium specimens, 97 specimens of living plants, about 30 packets of seeds, a collection of wood sections representing about 40 species of trees and shrubs, and a series of 142 photographs illustrating the vegetation of that region.

The study and identification of the collections of living plants has been continued, and much progress made in this direction.

Instruction has also been given to eight students who registered for work in horticulture; five of these entered in the spring and three in the fall. Of these four have taken the course in horticultural botany alone, three the course in elementary horticulture, and one received instruction in both courses.

GEORGE V. NASH,
Head Gardener.

REPORT OF THE SUPERINTENDENT OF BUILDINGS AND GROUNDS

To the Director-in-Chief.

Sir: I have the honor to submit the following report on buildings and grounds for the year ending December 31, 1904.

Buildings

Barn. In order to obtain additional stalls, considerable carpentry work was done in the autumn; all the old stalls were refloored. The whole of the interior was painted and stained. Additional ventilation was provided. Posts have been placed for the enclosure of the barnyard, and the fence will be constructed as soon as the weather permits.

Power House. The construction of machinery to remove ashes, now in progress, made it necessary to make changes at the southerly doorway and fanlights. The woodwork was painted and other minor repairs were made. A cement ashpit, 24 × 24 feet square, was constructed just south of the building.

Construction of Roads and Paths

The driveway in course of construction at my last report, commencing at the plaza near the N. Y. C. & H. R. R. R. station and extending to Newell Avenue, Williamsbridge, a distance of 3,950 feet, 40 feet in width, was graded, Telford laid and stone broken, up to 250 feet from the north gate. The building of this road used up a large heap of broken stone which we had stored west of the museum building, and considerable taken out of the quarry north of the conservatories; two thirds of this work was covered with traprock ready for the steam roller.

The curbstones on the Newell Avenue bridge were set and backed up on the sidewalk with a 12-inch fill of ashes. Owing to the early winter and heavy snow storms, the completion of this work had to be deferred.

Paths. A path east of the northern section of the herbaceous grounds, on the hillside leading from the driveway

opposite the drinking fountain through the woods to the arbor, about 700 feet in length and 10 feet in width, was graded, Telford foundation laid, and surfaced with screenings. It was opened to the public about the middle of October.

A path east of and parallel with the driveway, leading north from the drinking fountain east of the museum building to the curve of the road to the Blue Bridge, of which a part of the Telford was previously laid, was continued and graded, Telford foundation laid and surfaced to a length of 650 feet, 11 feet in width.

After the concrete tanks for aquatic plants in the court of the conservatories were completed by contract, their surroundings were brought to grade and surfaced with 12 to 18 inches of good topsoil; around these tanks 1,240 linear feet of paths, 15 and 20 feet in width, were constructed; the Telford stone for these paths was quarried in the rear of the museum building.

Two paths were graded and Telford laid east of the herbaceous grounds over the hills to the woods, and are to be continued parallel with the road through the woods to the southern boundary of the Garden.

Grading

A large area on the hillside east of the conservatories, of which a portion was previously graded and topsoiled, has been completed, topsoiled and sown. An area west of the south gate between the traffic road and the path along the southern boundary line has been filled in, drained, graded and topsoiled, sodded, sown, and made ready for planting. Three small plots and slopes further north along the driveway leading north, were graded and sown. An area north of the elevated railway station about 300 × 300 feet was regulated and sown.

To surface the above mentioned areas and a part of the court at the conservatories, we hauled 1,160 team loads of topsoil from vacant lots west of Webster Avenue and along Mosholu Parkway.

Numerous other small areas have also been graded, sodded and sown during the season.

Drainage and Sewerage

The drain in course of construction, mentioned in my report for 1903, from the cellar of the museum to the upper lake, was completed in April; its total length is 519 feet, requiring 235 feet of 8-inch pipe to a manhole, and 284 feet of 6-inch pipe up to the cellar. The average depth of the cut was about 14 feet; about 150 feet of the cut had to be made through solid rock and about 375 cubic yards of stone was excavated in accomplishing the work; at the museum building the pipe is 3 feet under the floor of the cellar.

A sewer 500 feet in length, 400 feet of 8-inch pipe and 100 feet of 6-inch pipe, with a catch-basin, was built to connect the drainage of the stables to the main sewer, north of the driveway.

Ground was broken on January 16 for the construction of two public comfort stations near and under the approach to the elevated railroad station, by contract, and a sewer was laid to drain them connecting with the 24-inch drain 80 feet south of the power house; this consists of 446 feet of 8-inch pipe and 148 feet of 6-inch pipe. The stations were put in commission on the 1st of July.

A pipe drain 38 feet in length, of 8-inch pipe, connecting with the old stone culvert near the west end of the upper lake, was constructed during road-building at this point. A 6-inch drain pipe about 100 feet further north, at the lowest point of the road, 64 feet in length, was laid to the lake to drain two basins to be built between the path and the road east of the path near the railroad.

A 12-inch drain pipe connecting with the 12-inch drain laid two years ago east of the Bronx River, was constructed; its length is 380 feet, running parallel with the new road from the eastern end of the long bridge now in process of construction.

The grading of different areas made it necessary to build

7 additional catch-basins and connect them with the main drains, 210 feet of 6-inch and 8-inch pipe being required, and 125 feet of 3-inch and 4-inch drain-pipe was laid under the grass plot between the driveway and path at the curve leading to the herbaceous grounds, to catch the spring water by which the road was constantly overflowed last winter.

Water Supply

One drinking fountain for man and horse was placed in August at a point near the junction of the two roads on the high ground opposite the stone hut on the west side of the river, and a waste pipe connected to the 12-inch drain.

One fountain for man was placed in July east of the herbaceous grounds near the road to the hemlock grove, and connected to the supply by 120 feet of ¾-inch pipe, and the waste pipe, 100 feet in length, connected with the brook.

About 75 feet of ¾-inch pipe was run along the wall of the new propagating house, with 2 taps for the water supply of the same.

All the hosetaps for sprinklers on the herbaceous grounds, 22 in number, have been replaced by new ones and enclosed in 8-inch concrete boxes lined with cement and covered by cast iron caps.

Quarry

Nearly all the soft rock in the rear of the museum building has been excavated and used for Telford foundation of the paths at the court of the conservatories and elsewhere.

A quarry was opened just northwest of the museum building on the high hill, which is now furnishing about 12 cubic yards of stone daily, and this is being hauled to the subgraded part of the driveway near Newell Avenue east of the Bronx River.

Miscellaneous

The catch-basins, 121 in number, have been inspected and cleaned at intervals, several along the driveways requiring constant attention; otherwise the drainage works to perfection.

Fourteen additonal garden benches of red cedar have been built and placed in shady spots along the paths. In October they were all collected and stored in the cellar of the conservatories for the winter.

About 20 tons of hay were cut and stored in barracks near the stables, providing fodder for the garden horses. Most of the cutting was confined to the east side of the Bronx River, but about 3 tons were obtained from the northern part of the fruticetum.

The horses are all in first-class health, and no veterinary surgeon nor medicine was required during the year. The wagons, carts and other equipment are all in good serviceable condition.

Respectfully submitted,

F. A. Schilling,

Superintendent of Buildings and Grounds.

SCHEDULE OF EXPENDITURES DURING 1904, UNDER APPROPRIATIONS MADE BY THE BOARD OF MANAGERS

1. City Maintenance Account		$70,000.00
Salaries and Labor.		
Appropriated	52,242.34	
Expended	52,242.34	
Supplies and Repairs.		
Appropriated	17,757.66	
Expended	17,757.66	
Total Expended		70,000.00
2. Construction and Equipment		44,125.52
Salaries and Labor.		
Appropriated	27,221.26	
Expended	27,221.26	
Sundry Expenses.		
Appropriated	16,904.26	
Expended	16,904.26	
Total Expended		44,125.52
3. Garden Accounts.		
Museums and Herbarium.		
Appropriated		3,750.00
Expended	3,447.59	
Transferred to Library	200.00	
Transferred to Contingent Fund	100.00	3,747.59
Balance		2.41
Library.		
Appropriated	2,175.00	
Transferred from Museums and Herbarium	200.00	2,375.00
Expended		2,370.69
Balance		4.31
Laboratories.		
Appropriated		1,700.00
Expended		1,699.92
Balance		.08

Publications (General Fund).

Appropriated		1,000.00
Expended		996.27
Balance		3.73

Exploration and Collecting.

Appropriated	2,000.00	
Transferred from Circulars for Membership	75.00	2,075.00
Expended		2,074.96
Balance		.04

Lectures and Announcements.

Appropriated	400.00	
Transferred from Special Assistance	150.00	550.00
Expended		547.53
Balance		2.47

Horticultural Prizes.

Appropriated		400.00
Expended		372.02
Balance		27.98

Investigations at other Institutions.

Appropriated	1,100.00	
Refund — Unexpended Balance	79.66	1,179.66
Expended		1,166.31
Balance		13.35

Resident Research Scholarships.

Appropriated		900.00
Expended	500.00	
Transferred to Contingent Fund	400.00	900.00

Editorial Assistance.

Appropriated	600.00
Expended	600.00

Expenses of Consulting Chemist.

Appropriated	300.00
Expended	300.00

Contingent Fund.

Appropriated	2,400.00	
Transferred from Museums and Herbarium..	100.00	
Transferred from Special Assistance.....	125.00	
Transferred from Resident Research Scholarships	400.00	3,025.00
Expended		3,023.30
Balance		1.70

Stable Equipment.

Appropriated	300.00	
Transferred from Special Assistance	25.00	325.00
Expended		321.35
Balance		3.65

Purchase of Plants.

Appropriated	575.00	
Transferred from Special Assistance	150.00	725.00
Expended		721.49
Balance		3.51

Circulars for Membership.

Appropriated		800.00
Expended	713.59	
Transferred to Exploration and Collecting...	75.00	788.59
Balance		11.41

Landscape Engineering.

Appropriated		720.00
Expended		720.00

Insurance.

Appropriated		400.00
Expended		366.81
Balance		33.19

Special Assistance.

Appropriated		1,200.00
Expended	731.83	
Transferred to Contingent Fund	125.00	
Transferred to Stable Equipment	25.00	
Transferred to Purchase of Plants	150.00	
Transferred to Lectures	150.00	1,181.83
Balance		18.17

Publications (Income of Lydig Fund).

Appropriated	1,200.00
Expended	1,196.75
Balance	3.25

Preservation of Native Plants (Income of Stokes Fund).

Appropriated	175.00
Expended	136.34
Balance	38.66

Aid for Students' Research (Income of Students' Research Fund).

Appropriated	100.00
Balance	100.00

Total Appropriated for Garden Accounts	22,195.00	
Refunds	79.66	22,274.66
Total Expended for Garden Accounts		22,006.75
Balance		267.91

4. Special Garden Accounts.

Conservatory Fund.

Subscribed 1900	2,110.00	
Subscribed 1901	25.00	
Refund — Balance on Draft	15.27	
Subscribed 1902	486.55	
Refund — Unexpended Balance	9.70	
Subscribed 1903	200.00	
Sale of Duplicate Palms	100.00	
Sale of Plants	78.00	
Sale of Palms 1904	125.00	3,149.52
Expended 1900	710.44	
Expended 1901	1,437.42	
Expended 1902	404.41	
Expended 1903	447.66	
Expended 1904	121.21	3,121.14
Balance		28.38

Museum and Herbarium Fund.

Subscribed 1901	1,800.00	
Subscribed 1902	655.00	
Refund (Advance Charges on Specimens, account of R. S. Williams)	131.09	
Subscribed 1903	1,405.00	
Sale of Specimens	29.50	
Subscribed 1904	100.00	4,120.59
Expended 1901	1,546.19	
Expended 1902	1,024.96	
Expended 1903	1,437.63	
Expended 1904	100.00	4,108.78
Balance		11.81

Exploration Fund.

Subscribed 1901	2,050.00	
Refund — Balance on Drafts	87.59	
Subscribed 1902	2,130.00	
Refund — Unexpended Balance	180.56	
Subscribed 1903	1,565.00	
Refunds — Unexpended Balances	275.11	
Subscribed 1904	3,183.45	
Refunds — Unexpended Balances	110.50	9,582.21
Expended 1901	2,130.95	
Expended 1902	1,258.32	
Expended 1903	2,880.72	
Expended 1904	2,878.28	9,148.27
Balance		433.94

Special Book Fund.

Subscribed 1899	4,950.00	
Subscribed 1901	1,825.00	
Subscribed 1902	2,265.00	
Subscribed 1903	1,315.00	
Special Contribution from Mr. Andrew Carnegie	1,997.88	
Sale of Books	59.60	
Refund — Balance on Drafts	20.93	
Subscribed 1904	1,540.00	
Sale of Duplicate Books	15.15	13,988.56

Expended 1899	1,916.65	
Expended 1900	2,395.28	
Expended 1901	2,463.02	
Expended 1902	2,256.25	
Expended 1903	3,397.75	
Expended 1904	1,031.92	13,460.87
Balance		527.69
Total Expenditures from Funds of the Garden		26,138.16

WALTER S. GROESBECK,
Accountant.

NEW YORK, January 9, 1905.

REPORT OF THE SCIENTIFIC DIRECTORS

To the Board of Managers of the New York Botanical Garden.

Gentlemen: The Scientific Directors have held two meetings during the year, in May and November respectively. They regret to report the loss of Professor F. S. Earle from the staff of the Garden, but can announce that very satisfactory reciprocal relations have been entered into with him in his present position as Director of the Agronomic Station in Cuba which will bear directly on the work of tropical exploration in progress by the Garden. Dr. William A. Murrill has been appointed Professor Earle's successor and has entered upon his work with enthusiasm, and his publications of original work are already attracting attention.

We would also report extensive continued exploration, commencing with subtropical Florida by Dr. Small and continuing with an extended survey of the Bahamas, a vast archipelago with a largely unknown flora lying next neighbor to our Florida peninsula. These explorations by members of the staff are bringing forth material results of the highest scientific importance. A project is also on foot to commence exploration of the flora of the newly established Republic of Panama, with which we are closely interested in commercial relations, but concerning whose flora very little comparatively is known. We also report the inauguration of the first part of the projected North American Flora, which is now in type and will soon be published.

A request has been sent to the finance committee of the Board regarding the adoption of measures relative to an increase of the endowment fund of the Garden as the most certain and satisfactory means by which the scientific work of the Garden can be enlarged and strengthened. We deem this measure of the greatest importance, for the whole welfare of every department of the Garden as an organization is directly dependent on the extent and character of its scientific work, and no other appropriations are available for this purpose.

We have also recommended to the Board the consideration of the project of placing four statues on the empty pedestals directly in front of the museum building as originally contemplated in the plans of the architect. We have selected for these subjects four men who have primarily been connected with the development of science and particularly of botany in New York, and through that city's commanding influence, with the development of the botany of the entire country. In making the selection of four men notable in the annals of science, we believe that no more worthy choice could be made in order to commemorate the historical development of botany and botanical institutions in New York than Mitchill, Hosack, Torrey, and Newberry.

1. Samuel Latham Mitchill, Member of Congress (1800–1804, 1810–1812), and of the U. S. Senate (1804–1809), Professor of Botany in Columbia (1793–1795), and in the College of Physicians and Surgeons (1820–1826), Founder of the Lyceum of Natural History (now the New York Academy of Sciences), first and foremost in his day in promoting the interests of science and medicine, "one of the most versatile and remarkable of men." To Mitchill we would give first place as founder and patron of science in New York.

2. David Hosack, Professor of Botany in Columbia (1795–1811), founder of the famous Elgin Gardens, the first movement towards a public botanical garden in New York City (1801), inspiring force in the early dissemination of botanical instruction in New York and throughout the country. To Hosack we would give second place as founder of botanical institutions and pioneer teacher of botany in New York.

3. John Torrey, Professor of Botany in the College of Physicians and Surgeons (1860–1873), first among the students of the local flora of New York, projector and senior author of the classic Flora of North America, with world-wide reputation as a distinguished botanist and botanical writer, whose collections form the nucleus of our present botanical development and give to it a historic value and im-

portance. We would give John Torrey a place second to none, as the Nestor of American botany.

4. John Strong Newberry, botanical explorer in western America (1855–1860), Professor in Columbia (1866–1892), President of the New York Academy of Sciences (1868–1892), one of the founders of the Torrey Botanical Club and its president from 1880–1890, one of the pioneers in palaeobotany in America, and interpreter of the significance of plant remains as a key to geological horizons, whose extensive accumulations of fossil plants form the foundation of our museum collections in that department. We would give Newberry a fourth place in this quartette of representatives of American Science, as a founder of palaeobotany in America.

Respectfully submitted,

L. M. Underwood,

Chairman, Scientific Directors.

January 9, 1905.

REPORT OF THE COMMITTEE ON PATRONS, FELLOWS, AND MEMBERS

To the Board of Managers of the New York Botanical Garden.

Gentlemen: The number of new members who have qualified during the past year is 77. The total number of annual members is now 948.

Of these 31 are now in arrears for dues for 1904, 7 are in arrears for 1903 and 1904, 6 are in arrears for 1902, 1903 and 1904, and 6 are in arrears for 1901, 1902, 1903 and 1904.

Annual dues have been collected to the amount of $9,170.00, which has been transmitted to the Treasurer as received.

Three persons have qualified as life members by the payment of $100.00 each. These sums have been transmitted to the Treasurer for credit to the Endowment Fund.

A complete list of Patrons, Fellows for Life, Life Members and Annual Members to date is herewith submitted.

New York, January 9, 1905.

Patrons

Hon. Addison Brown,
Andrew Carnegie,
Mrs. Geo. Whitfield Collord,
Columbia University,
* James M. Constable,
* Hon. Chas. P. Daly,
* Wm. E. Dodge,
Geo. J. Gould,
Miss Helen M. Gould,
Mrs. Esther Herrman,
John S. Kennedy,
D. O. Mills,
J. Pierpont Morgan,
* Oswald Ottendorfer,
John D. Rockefeller,
William Rockefeller,
* Wm. C. Schermerhorn,
Jas. A. Scrymser,
Samuel Sloan,
* Cornelius Vanderbilt,
Mrs. Antoinette Eno Wood.

Fellows for Life

Morris K. Jesup,
Mrs. Robert Hunter,
John Innes Kane,
Hon. Seth Low,
Miss Olivia E. Phelps Stokes,
Samuel Thorne,
Tiffany & Co.,
H. C. von Post.

* Deceased.

Life Members

Edward D. Adams,
Dr. Felix Adler,
A. G. Agnew,
Miss James Herrman Aldrich,
Richard H. Allen,
Constant A. Andrews,
J. Sherlock Andrews,
Wm. A. Anthony,
Mrs. H. D. Auchincloss
Samuel P. Avery, Jr.,
Samuel D. Babcock,
Geo. V. N. Baldwin,
Dr. John Hendley Barnhart,
Gustav Baumann,
Samuel R. Betts,
Miss Elizabeth Billings,
Mrs. Wm. T. Blodgett,
J. O. Bloss,
George Blumenthal,
George C. Boldt,
G. F. Bonner,
Geo. S. Bowdoin,
J. Hull Browning,
Miss Matilda W. Bruce,
Joseph Bushnell,
Thomas M. Carnegie,
Frank R. Chambers,
Hugh J. Chisholm,
Hugh J. Chisholm, Jr.,
E. Dwight Church,
Geo. C. Clark,
Banyer Clarkson,
Wm. F. Cochran,
William Colgate,
Miss Georgette T. A. Collier,
Mrs. William Combe,
W. E. Connor,
Wm. L. Conyngham,
Theodore Cooper,
Zenas Crane,
Melville C. Day,
Mrs. John Ross Delafield,
Miss Julia L. Delafield,
Maturin L. Delafield, Jr.,
Anthony Dey,
James Douglass,
Miss Josephine W. Drexel,
Miss Ethel DuBois,
Miss Katharine DuBois,
Wm. A. DuBois,
Geo. E. Dunscombe,
Mrs. John Dwight,
Thomas Dwyer,
Newbold Edgar,
George Ehret,
David L. Einstein,
Ambrose K. Ely,
Amos F. Eno,
Edward J. Farrell,
Andrew Fletcher,
Chas. R. Flint,
James B. Ford,
Mrs. Theodore Kane Gibbs,
James J. Goodwin,
J. B. M. Grosvenor,
Daniel Guggenheimer,
Bernard G. Gunther,
Franklin L. Gunther,
Frederic R. Halsey,
Chas. J. Harrah,
Dr. Louis Haupt,
H. O. Havemeyer,
R. Somers Hayes,
James J. Higginson,
George B. Hopkins,
Samuel N. Hoyt,
Gen. Thos. H. Hubbard,
Arthur M. Huntington,

Frank D. Hurtt,
Adrian Iselin,
Mrs. Columbus O'D. Iselin,
Theo. F. Jackson,
Dr. Walter B. James,
Dr. E. G. Janeway,
Walter R. T. Jones,
Miss Annie B. Jennings,
Eugene Kelly, Jr.,
Nathaniel T. Kidder,
William M. Kingsland,
H. R. Kunhardt,
W. B. Kunhardt,
Charles Lanier,
W. V. Lawrence,
Meyer H. Lehman,
Mrs. George Lewis,
Joseph Loth,
David Lydig,
Wm. H. Macy, Jr.,
Mrs. William H. Macy, Jr.,
Alexander Maitland,
Dr. Francis H. Markoe,
Louis Marshall,
Edgar L. Marston,
Bradley Martin,
Dr. Geo. N. Miller,
A. G. Mills,
Roland G. Mitchell,
John G. Moore,
A. Lanfear Norrie,
Gordon Norrie,
Geo. M. Olcott,
Mrs. Chas. Tyler Olmstead,
Wm. Church Osborn,
Lowell M. Palmer,
Geo. W. Perkins,
Henry Parish,
Geo. Foster Peabody,
Wm. Hall Penfold,
W. H. Perkins.
Mrs. Henry C. Potter,
James Tolman Pyle,
M. Taylor Pyne,
Geo. W. Quintard,
J. C. Rodgers,
H. H. Rogers,
Jacob Rubino,
Wm. R. Sands,
Reginald H. Sayre,
Edward C. Schaefer,
Jacob H. Schiff,
Mortimer L. Schiff,
Grant B. Schley,
Mrs. I. Blair Scribner,
Isaac N. Seligman,
Geo. Sherman,
William D. Sloane,
James Speyer,
Francis L. Stetson,
Anson Phelps Stokes,
Miss Ellen J. Stone,
Albert Tag,
Paul G. Thebaud,
Charles G. Thompson,
Robert M. Thompson,
Miss Phebe Anna Thorne,
William Thorne,
Wm. Stewart Tod,
Spencer Trask,
Miss Susan Travers,
Miss Anna Murray Vail,
F. T. Van Beuren,
Dr. Henry Freeman Walker,
F. N. Warburg,
John I. Waterbury,
Miss Emily A. Watson,
S. D. Webb,
Dr. W. Seward Webb,
Mrs. Joseph M. White,
John D. Wing,
Charles T. Yerkes.

Annual Members

Dr. Robert Abbe,
Fritz Achelis,
Ernest R. Ackerman,
Ernest Kempton Adams,
Samuel Adams,
Mrs. Cornelius R. Agnew,
John E. Alexandre,
J. H. Alexandre,
Wm. C. Alpers,
Bernard G. Amend,
G. Amsinck,
John A. Amundson,
A. J. C. Anderson,
J. M. Andreini,
A. B. Ansbacher,
John D. Archbold,
George A. Archer,
Francis J. Arend,
Reuben Arkush,
Mrs. H. O. Armour,
Dr. S. T. Armstrong,
Dr. Edmund S. F. Arnold,
Francis B. Arnold,
Col. John Jacob Astor,
Theo. Aub,
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John W. Auchincloss,
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W. H. Bailey,
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Stephen Baker,
Frederick H. Baldwin,
Robert F. Ballantine,
Theodore M. Banta,
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John S. Barnes,
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Geo. D. Barron,
E. W. Bass,
Chas. Batchelor,
Mrs. N. E. Baylies,
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Wm. R. Beal,
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L. L. Benedict,
M. W .Benjamin,
James Gordon Bennett,
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Geo. Blagden,
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Samuel Blatchford,
Mrs. S. A. Blatchford,
Cornelius N. Bliss,
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E. W. Bliss,
Miss S. D. Bliss,
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A. Blumenstiel,
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Temple Bowdoin,
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Henry L. Calman,
W. L. Cameron,
H. H. Cammann,
Henry L. Cammann,
Miss Isabella M. Cammann,
John Campbell,
Richard A. Canfield,
H. W. Cannon,
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Walter S. Carter,
H. T. Cary,
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John R. Caswell,
Dr. W. H. Caswell,
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Edmund Coffin,
E. W. Coggeshall,
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P. F. Collier,
F. Collingwood,
Miss Ellen Collins,
Mrs. Minturn Post Collins,
Stacy Budd Collins,
Miss Mary Compton,
T. G. Condon,
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Roland R. Conklin,
C. T. Cook,
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Henry H. Cook,
Hon. Edward Cooper,
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C. R. Corning,
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John Cotter,
Clarkson Cowl,
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Chas. Curie,
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W. Bayard Cutting,
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Ira Davenport,
J. Clarence Davies,
Julien T. Davies,
Wm. Gilbert Davies,
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Mrs. Henry Mills Day,
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H. de Coppet,
Richard Deeves,
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Mrs. Robert W. de Forest,
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Eugene Delano,
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Alfred Douglass,
R. D. Douglass,
Mrs. David Dows,
Tracy Dows,
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B. Ferdinand Drakenfield,
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Isaac W. Drummond,
Matthew B. DuBois,
Carroll Dunham,
Dr. Edward K. Dunham,
George H. Dunham,
E. B. Dunne,
James Dunne,
S. Whitney Dunscombe, Jr.,
H. A. Dupont,
J. B. Dutcher,
John Dwight,
D. Edgar,
Miss Laura Jay Edwards,
Edward Ehrlich,
Henry G. Eilsheimus,
August Eimer,
Emanuel Einstein,
Mrs. Matilda A. Elder,
Louis A. Eldridge,
Roswell Eldridge,
Geo. W. Ellis,
John W. Ellis,
J. M. Ellsworth,
John J. Emery,
C. Temple Emmet,
Robert Temple Emmet,
Robert Endicott,
Ad. Engler,
Jno. C. Eno,
R. Erbsloh,
Arthur F. Estabrook,
Louis Ettlinger,
Richard Evans,
H. C. Fahnestock,
Chas. S. Fairchild,
Samuel W. Fairchild,
Jas. C. Fargo,
Mrs. Farquhar Ferguson,
W. B. Osgood Field,
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Pliny Fisk,
E. W. Fitch,
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Miss Helena Flint,
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Scott Foster,
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Werner V. Frankenberg,
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Geo. F. Gantz,
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Joseph E. Gay,
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Mrs. James Gayley,
Frederick Gebhard,
Mrs. Walter Geer,

Thos. Ghee,
John J. Gibbons,
Mrs. Hervey de Blois Gibson,
R. W. Gibson,
J. Waldron Gillespie,
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S. L. Goldenberg,
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Ernest F. Greeff,
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John Greenough,
Isaac J. Greenwood,
Rev. David H. Greer,
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E. Morgan Grinnell,
C. A. Griscom, Jr.,
Hon. George J. Grossman,
William Guggenheim,
W. C. Gulliver,
Miss Delia L. Gurnee,
W. S. Gurnee, Jr.,
Dr. Alexander Hadden,
John A. Hadden, Jr.,
J. and M. Haffen,
James D. Hague,
Henry F. Haines,
Hon. Ernest Hall,
Miss Laura P. Halsted,
Wm. Hamann,
Miss Katherine L. Hamersley,
Louis Gordon Hamersley,
Miss Adelaide Hamilton,
Jas. B. Hammond,
Chas. T. Harbeck,
Anson W. Hard,
J. Montgomery Hare,
E. S. Harkness,
E. H. Harriman,
S. W. Harriot,
Allan C. Harris,
William Hamilton Harris,
Miss Rebecca Harvey,
Harold Hasbrouck,
Jacob Hasslacher,
F. C. Havemeyer,
J. C. Havemeyer,
T. A. Havemeyer,
G. G. Haven,
J. Woodward Haven,
E. Hawley,
Frederick W. Haynes,
Arthur H. Hearn,
Wm. W. Heaton,
John G. Heckscher,
L. A. Heinsheimer,
Arthur P. Heinze,
Clemens Heitemeyer,
Homer Heminway,
Mrs. Olivia P. Heminway,
Chas. R. Henderson,
Chas. Henderson & Son,
Edmund Hendricks,
Harmon W. Hendricks,
Selmar Hess,
Mrs. Sarah A. Hewitt,
Mrs. Daniel M. Hildreth,
Geo. R. Hill,
George D. Hilyard,
Walter Hinchman,
Wm. K. Hinman,
Dr. John H. Hinton,
J. Oakley Hobby,

B. Hochschild,
George F. Hodgmann,
Alfred G. Hoe,
Richard M. Hoe,
Mrs. Richard March Hoe,
Mrs. Robert Hoe,
John Swift Holbrook,
E. B. Holden,
E. R. Holden,
Miss Virginia Hollins,
Henry Holt,
Joseph Honig,
Isaac A. Hopper,
William W. Hoppin,
Frederick B. House,
Wm. P. Howe,
Gerald L. Hoyt,
Alex. C. Humphreys,
Miss Mary Duane Humphreys,
Mrs. C. P. Huntington,
Mrs. Robert P. Huntington,
Adolph G. Hupfel,
Frank Hustace,
John S. Huyler,
Clarence M. Hyde,
Frederick E. Hyde, Jr.,
Henry Iden, Jr.,
Mrs. Samuel Inslee,
John B. Ireland,
Adrien Iselin, Jr.,
C. Oliver Iselin,
Miss Georgine Iselin,
William E. Iselin,
Samuel Isham,
Wm. B. Isham,
Frederic Wendell Jackson,
Dr. Abram Jacobi,
A. C. James,
D. Willis James,
Dr. Robert C. James,
O. G. Janeway,
Walter Jennings,
Adrian H. Joline,
Dwight A. Jones,
Mrs. John D. Jones,
Jos. L. Kahle,
Louis Kahn,
O. H. Kahn,
Miss Louise Langdon Kane,
S. Nicholson Kane,
Theo. Kauffeld,
Mrs. H. F. Kean,
Mrs. Chas. Kellogg,
Thos. H. Kelly,
Prof. J. F. Kemp,
H. Van Rensselaer Kennedy,
Mrs. Elizabeth Kenyon,
Rudolph Keppler,
Mrs. Catherine L. Kernochan,
John B. Kerr,
Geo. A. Kessler,
A. P. Ketchum,
W. Keuffel,
Wm. Kevan,
Samuel K. Keyser,
Patrick Kiernan,
S. E. Kilner,
Alfred R. Kimball,
David H. King, Jr.,
Le Roy King,
William F. King,
Gustave E. Kissel,
A. Julian Klar,
Herman Knapp,
Chas. Kohlman,
Wm. Krafft,
H. C. Kudlick,
Julius G. Kugelman,
Percival Kühne,
Adolf Kuttroff,

William M. Laffan,
Rev. Anthony Lammel,
Francis G. Landon,
Edward V. Z. Lane,
Woodbury Langdon,
Woodbury G. Langdon,
J. Langeloth,
Dr. G. Langmann,
Lewis H. Lapham,
M. J. Lavelle,
John Burling Lawrence,
Mrs. Lydia G. Lawrence,
Mrs. Samuel Lawrence,
J. D. Layng,
Charles N. Lee,
Prof. Frederic S. Lee,
Mrs. Frederic S. Lee,
Marshall C. Lefferts,
Wm. H. Lefferts,
Emanuel Lehman,
Lemcke & Buechner,
Alfred Le Roy,
Edward A. Le Roy, Jr.,
Arthur L. Lesher,
Dr. A. Monae Lesser,
Wm. H. Leuppe,
Emil Levi,
Julius Levine,
Emanuel Levy,
Mrs. John V. B. Lewis,
Albert Lewisohn,
Miss Alice Lewisohn,
Philip Lewisohn,
O. B. Libbey,
Lowell Lincoln,
Frederick J. Lisman,
Wm. S. Livingston,
Wm. C. Lobenstine,
Luke A. Lockwood,
Williston B. Lockwood,
James Loeb,
Prof. Morris Loeb,
Walter S. Logan,
Henry Lomb,
Franklin B. Lord,
P. Lorillard, Jr.,
Bernard Loth,
R. P. Lounsberry,
C. Adolphe Low,
Miss Carlotta R. Lowell,
Mrs. Charles Russell Lowell,
Thomas Lowry,
Charles H. Ludington,
August Lueder,
Walther Luttgen,
Mrs. Alida McAlan,
C. W. McAlpin,
Geo. L. McAlpin,
John A. McCall,
Mrs. W. H. McCord,
John J. McCook,
Rev. Haslett McKim,
John A. McKim,
George R. McLane,
James McLean,
Geo. R. MacDougall,
J. W. Mack,
Clarence H. Mackay,
D. E. MacKenzie,
Malcolm MacMartin,
Mrs. Chas. A. Macy, Jr.,
V. Everit Macy,
F. Robert Mager,
J. H. Maghee,
Jacob Mehler,
Chas. Mallory,
Howard Mansfield,
Thos. L. Manson,
Miss Delia W. Marble,
Theophilus M. Marc,

A. Marcus,
Jacob Mark,
John Markle,
Dr. J. W. Markoe,
Henry S. Marlor,
C. P. Marsh,
Chas. H. Marshall,
Edwin S. Marston,
Mrs. E. Howard Martin,
W. R. H. Martin,
Francis Taylor Maxwell,
Robert Maxwell,
David Mayer,
Harry Mayer,
Effingham Maynard,
Mrs. Emma Mehler,
Herman A. Metz,
Dr. Alfred Meyer,
Edwin O. Meyer,
Harry J. Meyer,
J. Meyer,
Thos. C. Meyer,
John Miles,
Geo. M. Miller,
Jacob F. Miller,
S. M. Milliken,
Arthur M. Mitchell,
John Murray Mitchell,
Peter Moller,
Alphonse Montant,
G. L. Montgomery,
Chas. Arthur Moore, Jr.,
Wm. H. Helme Moore,
Mrs. Daniel Moran,
Miss Annie T. Morgan,
Miss C. L. Morgan,
Edward Morgan,
E. D. Morgan,
Geo. H. Morgan,
A. H. Morris,
A. Newbold Morris,
Mrs. A. Newbold Morris,
Mrs. Cora Morris,
Mrs. Dave Hennen Morris,
Miss Eva V. C. Morris,
Henry Lewis Morris,
John Morris,
Louis R. Morris,
Fred. V. Morrison,
Geo. Austin Morrison,
C. W. Morse,
Richard Mortimer,
Quincy L. Morton,
Henry C. Mott,
Carl Muller,
Mrs. H. W. Munroe,
Miss Catherine Murray,
J. G. Myers,
Nathaniel Myers,
Edward M. Neill,
Wm. Nelson,
A. G. Nesbitt,
Miss Catherine A. Newbold,
Miss Edith Newbold,
Frederic R. Newbold,
H. Victor Newcomb,
Zenas E. Newell,
Geo. L. Nichols,
John Barron Niles,
Wm. Nilsson,
John Notman,
Frederick J. Nott,
Mrs. Henry Noyes,
Francis J. Oakes,
Anthony Oechs,
James H. Ogilvie,
E. E. Olcott,
Robert Olyphant,
Mrs. Emerson Opdycke,
Wm. S. Opdyke,

Mrs. Wm. Openhym,
William C. Orr,
Prof. Henry F. Osborn,
Augustus G. Paine,
N. F. Palmer,
S. S. Palmer,
Henry Parish, Jr.,
James C. Parrish,
Henry V. A. Parsell,
Charles Parsons,
Mrs. Edwin Parsons,
John E. Parsons,
W. H. Parsons,
R. W. Paterson,
W. A. Paton,
O. H. Payne,
T. W. Pearsall,
Mrs. Frederick Pearson,
Mrs. Alfred Pell,
Miss Frances Pell,
Stephen H. P. Pell,
Henry E. Pellew,
Geo. H. Penniman,
Chas. J. Perry,
Samuel T. Peters,
W. R. Peters,
Chas. Pfizer, Jr.,
Guy Phillips,
Lloyd Phoenix,
Phillips Phoenix,
Gottfried Piel,
Henry Clay Pierce,
Winslow S. Pierce,
Gifford Pinchot,
James W. Pinchot,
Mrs. James W. Pinchot,
Fred. S. Pinkus,
Hon. Thos. C. Platt,
Gilbert M. Plympton,
H. F. Poggenburg,
Chas. Lane Poor,
Henry W. Poor,
A. S. Post,
H. A. V. Post,
C. A. Postley,
Miss Blanche Potter,
Frederick Potter,
Miss Martha Potter,
De Veaux Powel,
Anderson Price,
Chas. Pryer,
J. Harsen Purdy,
Percy R. Pyne,
Dr. Edward Quintard,
Charles Raht,
Gustav Ramsperger,
Geo. Curtis Rand,
Edmund D. Randolph,
G. B. Raymond,
Geo. R. Read,
Wm. A. Read,
G. H. Redmond,
Henry S. Redmond,
Whitelaw Reid,
Geo. N. Reinhardt,
E. B. Reynold,
John B. Reynold,
Miss Serena Rhinelander,
John Harsen Rhoades,
Auguste Richard,
Prof. P. de P. Ricketts,
John L. Riker,
Samuel Riker,
Wm. J. Riker,
R. Hudson Riley,
H. Dillon Ripley,
Dr. Wm. C. Rives,
Miss Mary M. Roberts,
Andrew J. Robinson,
Gen. Chas. F. Roe,

Edward L. Rogers,
Noah C. Rogers,
W. Emlen Roosevelt,
Mrs. W. Emlen Roosevelt,
Hon. Elihu Root,
Albert G. Ropes,
E. V. W. Rossiter,
Jacob Rothschild,
Wm. Rothschild,
Carman R. Runyon,
Jacob Ruppert,
Mrs. A. D. Russell,
Arthur Ryle,
Augustus St. Gaudens,
Clarence Sackett,
Mrs. Edward C. Sampson,
Daniel C. Sands,
Miss Marie L. Saniel,
Carl Schefer,
Miss Mary E. Schell,
J. Egmont Schermerhorn,
Mrs. H. M. Schieffelin,
Dr. Wm. J. Schieffelin,
Gustave Schirmer,
Rudolph E. Schirmer,
Henry W. Schloss,
Miss Jane E. Schmelzel,
Paul G. Schoeder,
C. Schumacher,
Philip Schuyler,
C. M. Schwab,
Geo. S. Scott,
Robert Scoville,
John H. Screven,
Edward M. Scudder,
Geo. J. Seabury,
Francis K. Seagrist,
Prof. Edwin R. A. Seligman,
George W. Seligman,
Jefferson Seligman,
T. G. Sellew,
Alfred Seton, Jr.,
Mrs. Clarence Seward,
W. H. Sheehy,
Edward M. Shepard,
Gardiner Sherman,
D. E. Sickles,
John W. Simpson,
W. T. Simpson,
John Sinclair,
Francis Louis Slade,
Albert K. Smiley,
Daniel Smiley,
Chas. F. Smillie,
Mrs. Annie Morrill Smith,
Chas. Robinson Smith,
F. M. Smith,
Mrs. George W. Smith,
James H. Smith,
James R. Smith,
Walter M. Smith,
Wm. Alex. Smith,
E. G. Snow,
E. G. Soltmann,
Chas. Sooysmith,
Mrs. Charlotte Sorchan,
Frederick Southack,
Samuel Spencer,
I. M. Spiegelberg,
Paul N. Spofford,
Miss Anna Riker Spring,
Dr. Edward Hamilton Squibb,
John Stanton,
J. R. Stanton,
Jno. N. Stearns,
James H. Stebbins,
James R. Steers,
Chas. H. Steinway,
Wm. R. Steinway,
Olin J. Stephens,

Benjamin Stern,
Isaac Stern,
Louis Stern,
Winfield S. Stern,
Alexander H. Stevens,
Frederic W. Stevens,
Dr. Geo. T. Stevens,
Lispenard Stewart,
Wm. R. Stewart,
Miss Clara F. Stillman,
Dr. D. M. Stimson,
James Stokes,
Mason A. Stone,
Sumner R. Stone,
William Stratford,
Chas. Strauss,
F. K. Sturgis,
Mrs. F. K. Sturgis,
Edmund Sturzenegger,
Rutherfurd Stuyvesant,
Mrs. Geo. Such,
Mrs. James Sullivan,
Lionel Sutro,
Mrs. P. C. Swords,
Miss Mary Taber,
Edward N. Tailer,
James Talcott,
C. A. Tatum,
Thos. Tavenor,
Miss Alexandrina Taylor,
George Taylor,
Henry R. Taylor,
Stevenson Taylor,
C. H. Tenney,
H. L. Terrell,
Jno. T. Terry,
Nikola Tesla,
Thomas Thacher,
Ernst Thalmann,
Dr. Allen M. Thomas,
Geo. C. Thomas,
Seth E. Thomas,
David W. Thompson,
John C. Thompson,
L. S. Thompson,
Mrs. Samuel C. Thompson,
Walter Thompson,
Dr. W. Gilman Thompson,
Samuel Thorne, Jr.,
W. V. S. Thorne,
H. L. Thornell,
C. C. Tiffany,
Louis C. Tiffany,
Frank Tilford,
James Timpson,
J. Kennedy Tod,
William Tousey,
Mrs. Jane A. Townsend,
R. H. L. Townsend,
C. D. Tows,
J. Evarts Tracy,
Miss Mary S. Trimble,
Frederick K. Trowbridge,
Dr. Alfred Tuckerman,
Paul Tuckerman,
Geo. E. Turnure,
Benjamin Tuska,
Edward P. Tysen,
Edward Uhl,
E. S. Ullman,
Herbert Valentine,
Mrs. Lawsen Valentine,
Chas. H. Van Brunt,
Augustus Van Cortlandt,
Alfred G. Vanderbilt,
D. B. Van Emburgh,
E. H. Van Ingen,
W. Van Norden,
Edgar B. Van Winkle,
Miss Elizabeth Van Winkle,

Richard C. Veit,
Herman Vogel,
John Wagner,
Lewis Wallace,
Wm. I. Walter,
Wm. T. Wardwell,
John Hobart Warren,
Allan C. Washington,
J. Henry Watson,
E. H. Weatherbee,
Mrs. H. Walter Webb,
Mrs. John A. Weekes,
Chas. Wehrhane,
Camille Weidenfeld,
Charles W. Wells,
Mrs. John Wells,
R. E. Westcott,
Geo. Westinghouse,
Dr. John McE. Wetmore,
Dr. Geo. G. Wheelock,
Dr. Wm. E. Wheelock,
Miss Caroline White,
Horace White,
John J. White, Jr.,
Stanford White,
Dr. Whitman V. White,
James Whiteley,
Miss Gertrude Whiting,
Giles Whiting,
Clarence Whitman,
Wm. Wicke,
Edward A. Wickes,
D. O. Wickham,
M. T. Wilbur,
David Willcox,
Jno. T. Willets,
Robt. R. Willets,
Mrs. I. T. Williams,
Richard H. Williams,
Mrs. Douw D. Williamson,
W. P. Willis,
Charles T. Wills,
Henry R. Wilson,
Washington Wilson,
Wm. G. Wilson,
Egerton Winthrop,
Grenville L. Winthrop,
Mrs. Frank S. Witherbee,
Ernst G. W. Woerz,
Mrs. Anzonetta B. Wolfe,
Emil Wolff,
Lewis S. Wolff,
Mrs. Cynthia A. Wood,
Henry R. Wood,
James Wood,
F. F. Woodward,
Jas. T. Woodward,
Prof. R. S. Woodward,
W. H. Woolverton,
Isidor Wormser,
Miss Julia Wray,
Mrs. J. Hood Wright,
A. Wurzburger,
Arthur G. Yates,
Edw. L. Young,
Andrew C. Zabriskie,
Wm. Ziegler,
August Zinsser,
Charles Zoller,
O. F. Zollikoffer.

New York, January 9, 1905.

To the Board of Managers of
the New York Botanical Garden.

Gentlemen:

Herewith I submit a statement of my receipts and disbursements during the year 1904, and a balance sheet from my ledger as of December 31, 1904.

Respectfully yours,

C. F. Cox, *Treasurer.*

Receipts.

Balance as per last Annual Report.....		$25,081.43
Contributions of the City towards Development and Maintenance.....		103,188.82
Income from Investments:		
5 per cent. on $50,000 Southern Railway Co. First Consolidated Mtge. Bonds.....$	2,500.00	
4½ per cent. on $50,000 Ches. & Ohio R. R. Co. Genl. Mtge. Bonds.....	2,250.00	
4 per cent. on $50,000 Erie R. R. Co. Prior Lien Bonds	2,000.00	
4 per cent. on $59,000 Erie R. R. Co., Penn. Collat. Trust Bonds	2,360.00	
4 per cent. on $50,000 Reading R. R. Co., Jersey Central Collat. Trust Bonds.....	2,000.00	
4 per cent. on $24,000 Nor. Pacific R. R. Co. St. Paul & Duluth Division Bonds.....	960.00	
4 per cent. on $30,000 Nor. Pacific-Gt. Northern, C. B. & Q. Collat. Trust Bonds	1,200.00	13,270.00
Annual Dues.....		9,130.00
Interest at 3 per cent. on balances on deposit with J. P. Morgan & Co.....		266.55
Proceeds sales of Merchandise.....		9.75

Proceeds sales of Publications	154.23
Life Membership Fees	300.00
Tuition Fees, credited to Students' Research Fund	293.25
On account Bequest of Charles P. Daly, credited "David Lydig Fund."	1,582.66
Contributions to Special Book Fund	1,015.00
Contributions to Exploration Fund	2,983.45
Contributions to Museum & Herbarium Fund	100.00
	$157,375.14

Disbursements

Expenses paid through Director-in-Chief account City Appropriation	$103,188.82		
on General account for Vouchers paid	18,689.41	$121,878.23	
Invested in purchase of $16,000 Nor. Pac.-Gt. Nor., C. B. & Q. Coll. Trust Bonds at 93⅝ and 93¾ and interest		15,005.00	
Lectures and Literature on Preservation of Native Flora, account Income of Stokes Fund		142.47	
Books,—account Special Book Fund		1,408.21	
Plants, — account Conservatory Fund	$129.46		
Less Sales	125.00	4.46	
Specimens, etc., — account Exploration Fund		4,406.70	
Specimens, etc.,—account Museum & Herbarium Fund		814.44	
Publications,—account Income of David Lydig Fund		1,527.57	145,187.08
Balance, Cash in hands of Treasurer,			$12,188.06

LEDGER BALANCES, DECEMBER 31, 1904

Credit

Permanent Funds:	
Endowment Fund	$270,775.00
Fellowship Fees	8,000.00

Life Membership Fees	16,800.00
Students' Research Fund	2,376.50
David Lydig Fund — Bequest of Chas. P. Daly	34,149.86
Stokes Fund	3,000.00
Temporary Funds:	
Special Book Fund, for Library	236.29
Conservatory Fund, for Plants	28.38
Exploration Fund	535.38
Museum and Herbarium Fund, for Specimens	11.81
Income Students' Research Fund	274.07
Income Stokes Fund	48.88
Income David Lydig Fund	91.51

Debit

Investments:		
Net Cost of $50,000 Ches. & Ohio Ry. Co. Genl. Mtge. Bonds..		
$50,000 Southern Ry. Co. 1st Consol. Mtge. Bonds		
$50,000 Erie R. R. Co. Prior Lien Bonds		
$59,000 Erie R. R. Penn. Coll. Trust Bonds	$302,611.68	
$50,000 Reading R. R. Co. Jersey Cent. Coll. Trust Bonds..		
$24,000 N. Pacific R. R. Co. St. Paul & Duluth Div. Bonds		
$30,000 N. Pacific-Gt. Northern C. B. & Q. Coll. Tr. Bonds		
Director-in-Chief, Working Fund	20,000.00	
General Income Account, Balance borrowed from Permanent Funds	1,527.94	
Cash in hands of Treasurer	12,188.06	
	$336,327.68	$336,327.68

66 Broadway, New York, February 4, 1905.

Dr. D. T. MacDougal, *Assistant Director*,
New York Botanical Garden,
Bronx Park, New York City.

My Dear Sir: I beg to notify you that I have caused the accounts of the Treasurer of the New York Botanical Garden to be examined and audited for the year 1904, and take pleasure in reporting that the same have been found to be correct, in accordance with the Balance Sheet and Statement of Receipts and Disbursements enclosed herewith, with the Auditor's Certificate attached.

Yours very truly,

(*signed*) James A. Scrymser,
Chairman, Finance Committee,
New York Botanical Garden.

BULLETIN
OF
The New York Botanical Garden

Vol. 4. No. 13.

Contributions to the Flora of the Bahama Islands. II*

By N. L. Britton

Echinodorus cordifolius (L.) Griseb.

Sink holes near Georgetown, Great Exuma. (*Britton & Millspaugh, 3104*).

Sagittaria lancifolia L.

Uncommon in the Bahamas, occurring in fresh-water or slightly brackish marshes in New Providence (*Coker, 176; Brace, 386*); Great Bahama (*Britton & Millspaugh, 2660*).

Cymodocea manatorum Aschers.

In the sea, Eight-Mile Bay, Abaco (*Brace, 1886*); washed ashore, Barnett's Point, Great Bahama (*Britton & Millspaugh, 2704*).

Aloe vera L.

Naturalized along roadsides and in scrub-land on Great Exuma (*Britton & Millspaugh, 3050*).

Physurus querciticola Lindl.

Under bushes in pine lands, Eight Mile Rocks, Great Bahama. A single specimen found (*Britton & Millspaugh, 2382*).

Prescottia oligantha (Sw.) Lindl.

On stone walls, Waterloo Coppice, New Providence (*E. G. Britton, 3437*).

Pelexia spiranthoides Lindl.

Couch Sound, Andros (*Northrop, 567*). Distributed as *Cranichis* sp.

*Continued from Volume 3: p. 453.

Pelexia setacea Lindl.

Maidenhead Coppice, New Providence (*E. G. Britton, 3201*); coppice, Pinder's Point, Great Bahama (*Britton & Millspaugh, 2520*).

Vanilla phaeantha Reichb. f.

Coppice, Barnett's Point, Great Bahama (*Britton & Millspaugh, 2631*); coppice, California Road, Abaco (*Brace, 2043*).

Epidendrum primulinum Batem.

California Road, Abaco (*Brace, 2059*). Determined by R. A. Rolfe.

Peperomia obtusifolia (L.) A. Dietr.

Coppice, Eight Mile Bay, Abaco (*Brace, 1876*). The only species of the family yet known from the Bahamas.

Ficus aurea Nutt. Sylva, **2**: 4. *pl. 43*. 1846.

Ficus sapotifolia Kunth & Bouché, Ind. Sem. Hort. Berol. 17. 1846.

In Symb. Ant. **3**: 460, Dr. Warburg, in his monograph of the West Indian figs, has brought these supposedly different species close together, but regards them as distinct, principally on the character of leaf-form, *F. aurea* being there described as with ovate obtusish leaves, *F. sapotifolia* with elliptic to oblong acute leaves. Our series of specimens does not bear out these differences and I regard the two supposed species as one; the leaves vary to obovate. The tree is common in the Bahamas. Some of Nuttall's type material of *Ficus aurea*, collected by Dr. Blodgett on Key West, Florida, has elliptic leaves acutish at both ends, just as figured by Nuttall. Dr. Warburg gives the date of Nuttall's name as 1854, but it is really 1846.

Coccolobis uvifera L.

A form of this widely distributed tree, with fruits less than half the size of the common one, is abundant on Inagua, its perfectly ripe "grapes" often less than 1 cm. in diameter (*Nash & Taylor, 1226, 1055*).

Coccolobis bahamensis sp. nov.

A glabrous shrub, 4 m. high or less. Leaves thin-coriaceous, elliptic to ovate or obovate-elliptic, obtuse to acutish at the apex, obtuse, somewhat narrowed, or subcordate at the inequilateral base, 4–7 cm. long, 5 cm. wide or less, the primary veins 6–8 on each

side, minutely but strongly reticulate-nerved on both surfaces, dull, the upper surface bright green, the lower surface paler; petioles 3–5 mm. long; racemes very slender, numerous, recurved-drooping, finely puberulent when very young, in fruit glabrous; pedicels 1 mm. long in fruit, much longer than the ochreolae; flowers bright white, 3–4 mm. broad; sepals oval, obtuse, about as long as the stamens; fruit ovoid, narrowed at the base, bluntish at the apex, 6 mm. long, 3–4 mm. thick, faintly several-ribbed, not coronate.

Mathew Town to Lower Savannah, Inagua (*Nash & Taylor, 1352*, type); Miner's Tent to Balsam Hill, Inagua (*Nash & Taylor, 1280*); coppice, Lake Cunningham, New Providence (*Britton & Brace, 647*). The abundant gracefully drooping racemes of bright white flowers make the bush very beautiful.

Persea pubescens (Pursh) Sargent.

Palmetto lands, Barnett's Point, Great Bahama (*Britton & Millspaugh, 2650*).

Clematis bahamica (Kuntze) Britton.

Clematis dioica var. *virginiana* 2. *bahamica* Kuntze, Verhand. Bot. Ver. Prov. Brand. **26**: 102. 1885.

Vine slender, trailing or high-climbing, the young plants sparingly and loosely pubescent. Leaves trifoliolate or the uppermost simple; leaflets slender-stalked, 4 cm. long or less, various in form even on the same vine, ovate to oval or nearly orbicular, acute or obtuse and mucronulate at the apex, quite glabrous when mature, entire, or often 3-lobed, firm in texture and strongly veined on the under side; achenes plump, only 3 mm. long, the filiform plumose style 3–5 cm. long; flowers not yet collected.

Dr. Kuntze gave the name to this plant only from his study of Mr. Brace's *no. 391* in the Kew Herbarium, which is a scrap collected on Eleuthera, showing the young leaves just unrolling and from which he obtained the faulty impression that the leaflets are linear in outline. Our collections illustrate the species from Abaco (*Brace, 1516, 1594, 1931*); Great Bahama (*Britton & Millspaugh, 2393*); Great Exuma (*Britton & Millspaugh, 3051*). It seems to be more nearly related to *C. dioica* L., the type locality of which is Jamaica, than to any other species.

Brassica integrifolia (West) O. E. Schultz.

Waste places, Georgetown, Great Exuma (*Britton & Millspaugh, 3119*).

Capparis cynophallophora L.

Shore of Cave Cay, Exuma Chain (*Britton & Millspaugh,*

2808). Rare in the Bahamas and apparently not previously reported.

CAESALPINIA VESICARIA L.

Rocky coppice, Great Guana Cay (*Britton & Millspaugh, 2881*); Long Island (*Coker, 516*).

Caesalpinia reticulata sp. nov.

A shrub or small tree, 4 m. high or less, similar to *C. bahamensis*. Stem and branches unarmed in all specimens observed; young shoots puberulent; leaflets 2 to 4 pairs, obliquely oval or obliquely obovate, coriaceous, glabrous when mature, strongly finely reticulate-nerved and shining above, dull and less prominently nerved beneath, rounded, truncate or slightly emarginate at the apex, narrowed or obtuse at the base, 1.5–5 cm. long, 3 cm. wide or less, very inequilateral; petiolules 2–3 mm. long; racemes solitary or 2 or 3 together, 2 dm. long or less; flowers yellowish-white; pedicels ascending, 1–2 cm. long, becoming very stout in fruit; calyx stipitate, the tube nearly hemispheric, its lower lobe hooded, rather more than twice as long as the other broad acutish ones; stamens long-exserted; legume flat, smooth, 6–9 cm. long, 1.5 cm. wide, its stipe somewhat longer than or equaling the persistent calyx-tube.

Inagua (*Nash & Taylor, 1012* type; *1269,1419,1455*). *C. bahamensis* Lam., based on Catesby's plate (vol. **2**: *pl. 51*), and well illustrated there, is a taller tree, with smaller, less strongly nerved and nearly equilateral leaflets, its stem aud branches abundantly armed with prickles, its pedicels more slender and its flowers somewhat smaller; the flowers are not white as described by Catesby, but greenish yellow. It is known to me from New Providence (*Cooper, 94; Coker, 84; Curtiss, 128; Eggers, 4176; Britton, 2; Britton & Brace, 539*) and Andros (*Northrop, 426a*). It is recorded by Professor Urban (Symb. Ant. **2**: 278) from Acklin Island and Fortune Island.

Guilandina ovalifolia (Urban).

Caesalpinia ovalifolia Urban, Symb. Ant. **2**: 273.

Common in coastal coppices on New Providence and Hog Island (*Northrop, 116*, type; *Britton & Brace, 276, 329; Curtiss, 143*); Eleuthera (*Coker, 360*). The leaflets vary from rounded to narrowed at the base, and their terminal mucro is often 2 mm. long; racemes solitary or in pairs, 1.5–2 dm. long; bracts narrowly lanceolate, attenuate-acuminate, 8 mm. long, soon spreading; pedicels 1–1.5 cm. long; sepals oblong, obtuse, densely tomentulose, 6–7 mm. long, 1.5–2 mm. wide, soon reflexed; petals bright yellow, about

as long as the sepals, oblong to oblong-spatulate, obtuse; legume obliquely obovate, 6–8 cm. long, 4 cm. wide, 2 cm. thick, shining, armed with numerous rather distant yellow stiff bristles 6 mm. long or less, its sharp stout beak about 1 cm. long; seed globular, yellow-brown, shining, 1.6 cm. in diameter.

The type specimens are not quite typical of the species, having small leaves obtuse at both ends.

DOLICHOLUS SWARTZII Vail.

Coppice, Pinder's Point, Great Bahama (*Britton & Millspaugh, 2519*); occasional in coppice-lands on New Providence (*Britton & Brace, 865; E. G. Britton, 3358, 3390, 3440*).

TRIFOLIUM REPENS L.

Edge of street, Nassau (*Britton, 3367*).

Canavalia bahamensis sp. nov.

A long vine, related to *C. cubensis* Griseb. Leaflets thin, oblong-lanceolate to ovate-oblong, 5–8 cm. long, firm, glabrous, faintly veined, narrowed or obtuse at the base but not cordate, the apex bluntly acute; racemes stout-peduncled, slightly pubescent, longer than the leaves, nodose, pendent, 5–8 cm. long, the peduncles shorter; pedicels curved, erect, 2–4 mm. long; bractlets at base of calyx 2, orbicular, 1 mm. broad, lacerate; calyx very oblique, 6–8 mm. long, with one small acute tooth opposite the keel-petals, the much larger upper lip with three short broad teeth; corolla about twice as long as the calyx, the standard purple, the wings and strongly curved keel pink; legume linear-oblong, compressed, about 12 cm. long, 3 cm. wide, 1–1.5 cm. thick, short-pointed, narrowed at the base, not constricted, the stout stipe 1–2 cm. long, the valves rather membranous; seeds oval, 1.5 cm. long, 1 cm. thick, red-brown, shining.

Climbing over shrubs, Marsh Harbor, Abaco (*Brace, 1620*, Dec. 10, 1904, flowering specimen, type); Tarpum Bay, Eleuthera (*Coker, 411*, fruiting specimen, July 7, 1903).

POLYGALA CORALLICOLA Small, Bull. N. Y. Bot. Gard. 3: 425.

Pinelands, Eight Mile Rocks, Great Bahama (*Britton & Millspaugh, 2372*); border of brackish marsh, Adelaide, New Providence (*Britton & Brace, 449*).

CROTON ROSMARINIFOLIUS Griseb.

Abundant on Great Exuma, forming small trees up to 3.5 m. high (*Britton & Millspaugh, 2978*).

Bernardia Bernardia (L.) Britton; Coker in Shattuck, Bahama Islands, 257. 1905.

Fortune Island (*Brace*, *458*); Tarpum Bay, Eleuthera (*Coker*, *405*).

Securinega Acidothamnus (Griseb.) Muell. Arg.

Mangrove Cay (*Coker*, *225*); coppice near Southwest Landing, New Providence (*Britton & Brace*, *475*; *Britton*, *3332*); common in scrub-lands on Great Exuma (*Britton & Millspaugh*, *2958*).

Ilex Cassine L.

Swampy palmetto lands, Barnett's Point, Great Bahama (*Britton & Millspaugh*, *2683*).

Ayenia pusilla L.

In red land, Haynes' Road, Great Exuma (*Britton & Millspaugh*, *3027*); Cat Island (*Hitchcock*). Rare in the Bahamas.

Hibiscus bahamensis sp. nov.

A shrub, the leaves, calyx, peduncles and twigs densely and finely stellate-pubescent. Leaves ovate in outline, palmately veined, 10 cm. long or less, firm in texture, cordate to truncate at the base, 3-lobed or 5-lobed with the middle lobe much the longest and acuminate, the lateral lobes acute or obtuse, irregularly dentate; upper leaves varying to lanceolate, and merely dentate; petioles as long as the blades or shorter; peduncles stout, solitary in the axils, longer than the subtending petioles, jointed near the middle; bractlets linear-lanceolate, acuminate, very unequal, the longer about 1.5 cm. long; calyx 2–2.5 cm. long, densely stellate-pubescent, its oblong lobes strongly veined, acuminate; petals brownish, 3.5 cm. long, densely pubescent without, oblanceolate, obtusish; capsule oval, 2.5 cm. long, 2 cm. thick, densely silky.

California Road, Abaco (*Brace*, *2042*, type); Nicol's Town, Andros (*Northrop*, *397*); Tarpum Bay, Eleuthera (*Coker*, *404*). Related to the Cuban *H. cryptocarpus* Rich., and referred to that species by Mrs. Northrop.

Sida hederaefolia Cav.

Roadside, Eight Mile Rocks, Great Bahama (*Britton & Millspaugh*, *2495*).

Passiflora lunata Willd.

Pigeon Cay, Abaco (*Brace*, *1664*); Great Cistern, Abaco (*Brace*, *1762*); New Providence (*Brace*, *487*).

Passiflora pectinata Griseb.

A long vine trailing in sandy soil or climbing on shrubs, the

very showy flowers pure white. Turks Islands (*Hjalmarson*, type in Herb. Kew); Fortune Island (*Brace*, *455*); Green Cay (*Coker*, *242*); Inagua (*Nash & Taylor*, *985*, *1134*, *1231*); Cave Cay (*Britton & Millspaugh*, *2825*); Great Guana Cay (*Britton & Millspaugh*, *2917*).

Ludwigia microcarpa Michx.

Palmetto lands, Golden Grove, Great Bahama (*Britton & Millspaugh*, *2734*).

Hydrocotyle verticillata Thunb.

Moist palmetto lands, Barnett's Point, Great Bahama (*Britton & Millspaugh*, *2651*). The determination is based on leaf specimens only.

Jacquinia keyensis Mez.

Very common in coastal thickets and scrub-lands, both in sandy and rocky soil, from Abaco and Great Bahama to Inagua. The pure white flowers are delightfully fragrant; the corolla 12–14 mm. broad. The mature fruit is white.

Mimusops parvifolia (Nutt.) Radlk.

The "wild sapodilla" has a wide range in the Bahamas, occurring as a prominent feature of the coastal thickets and scrub-lands from Abaco and Great Bahama to Inagua, less abundant on New Providence than on many other islands. It is identical with the tree of South Florida, erroneously referred to *M. Sieberi* DC. of Trinidad.

Sabbatia campanulata (L.) Torr.

Marsh Harbor, Abaco (*Brace*, *1793*); palmetto lands, Barnett's Point, Great Bahama (*Britton & Millspaugh*, *2663*). Plainly distinct from the white-flowered *S. simulata* Britton, Bull. N. Y. Bot. Gard. 3: 448, in its larger rose-pink corolla.

Sabbatia simulata Britton.

Swampy pine barren, Marsh Harbor, Abaco (*Brace*, *1617*).

Jacquemontia reclinata House, Bull. N. Y. Bot. Gard. 3: 435.

This species, originally described from specimens collected by *Small & Carter* on Bull Key, Florida, is abundant on the Bahamas, and clearly distinct from *J. jamaicensis*, which often grows near it; while closely related, I observed no intergrading. The leaves of *J. reclinata* are broad and fleshy, those of *J. jamaicensis*

narrow and thin. We have specimens as follows: Abaco (*Brace, 1575*); Little Galiot Cay (*Britton & Millspaugh, 2845*); Cave Cay (*Britton & Millspaugh, 2833*); Great Guana Cay (*Britton & Millspaugh, 2921*, corolla yellowish within, 8 mm. broad); Inagua (*Nash & Taylor, 1132, 1318*); it occurs also on Fortune Island (*Eggers, 3853*), and this specimen has been included by Prof. Urban in *J. jamaicensis*.

IPOMOEA LITTORALIS (L.) Boiss.

Running in sand, shore of Great Guana Cay, Exuma Chain (*Britton & Millspaugh, 2918*). Corolla pure white.

Heliotropium diffusum sp. nov.

Perennial by slender deep root. Stem slender, 4 cm. high or less, the branches diffusely spreading, very slender, longer than the stem, 8 cm. long or less, appressed-strigose; leaves linear, 3–4 mm. long, about 1 mm. wide, sessile, acute, appressed-strigose; flowers white, minute, enclosed in the tufts of upper leaves; sepals lanceolate to ovate-lanceolate, acute, about 2 mm. long, very hairy; ovary deeply 4-lobed; fruit 4-lobed, depressed, about 1 mm. wide, and about one half as high as wide, the very short style capped by a broad abruptly-tipped stigma.

Moujean Harbor, Little Inagua, October 20, 1904 (*Nash & Taylor, 1221*).

HELIOTROPIUM NANUM Northrop.

Originally described from specimens collected at Red Bays, Andros, this interesting little species occurs abundantly in the sandy "white land" at the Race Course, west of Nassau (*Britton & Brace, 277*), also in similar soil on Little Harbor Cay, Berry Islands (*Britton & Millspaugh, 2238*).

Heliotropium inaguense sp. nov.

A low shrub, 5–20 cm. high, intricately much-branched, very densely appressed-strigose all over with nearly white hairs. Leaves opposite, ascending or appressed, lanceolate or oblong-lanceolate, 3–5 mm. long, about 1 mm. wide, sessile, acutish, somewhat revolute-margined, mostly longer than the internodes; flowers few, solitary and very nearly sessile in the upper axils; sepals similar to the upper leaves; corolla white, its tube 2 mm. long, its 5 ovate acute lobes about 1 mm. long, spreading; stamens nearly sessile on the corolla-tube below the middle; style very short, stout; stigma 4-lobed.

Canfield Bay to Cabbage Pond, Inagua (*Nash & Taylor, 1293*, type); white lands, Tenados, Inagua (*Nash & Taylor, 1033*).

Superficially resembling the Cuban plant referred to *H. microphyllum* Sw. (*Wright, 3139*), and *H. nanum* Northrop, of Andros, New Providence, and the Berry Islands.

Lantana ovatifolia sp. nov.

Stems woody, little branched, diffusely spreading, 7 dm. long or less, bluntly 4-angled, very rough-pubescent with stiff appressed hairs. Leaves ovate, thick, short-petioled, 5 cm. long or less, very scabrous on the upper surface, rough-pubescent with stiff hairs beneath, especially on the 4 to 6 principal veins on each side of the prominent mid-vein, acute at the apex, abruptly cuneate-narrowed at the obtuse or subtruncate base, the margin low-crenate nearly all around; petioles rather stout, rough, 3–5 mm. long; peduncles axillary, slender, about 4 cm. long, smooth or nearly so when old; flowers and fruit not seen.

A peculiar species sprawling among shrubs and *Pteridium*, in pine-lands, Eight Mile Rocks, Great Bahama (*Britton & Millspaugh, 2450*).

Lantana balsamifera sp. nov.

A shrub, 1.6 m. high or less, forming large masses, with a balsamic odor, the slender bluntly angular branches ascending, puberulent; the internodes short, often not longer than the small leaves. Leaves elliptic to ovate-elliptic or nearly orbicular, 5–10 mm. long, 5 mm. wide or less, puberulent, acute or obtuse, firm, crenulate, rugose-reticulated above, paler and rather strongly veined beneath, the petioles 1–1.5 mm. long; peduncles slender, thickened above, 8–15 mm. long in fruit; heads about 6 mm. broad, several-flowered; bracts lanceolate, puberulent, obtusish, 2.5–3 mm. long; calyx 2-toothed, pubescent, 1 mm. long, its teeth blunt; corolla purple, its slightly gibbous tube about 3 mm. long, its spreading limb with 5 unequal obtuse lobes; stamens borne near the top of the corolla-tube, the anthers as long as the filaments or longer.

Moujean Harbor, Little Inagua (*Nash & Taylor, 1211*, type; *1203; 1198*). Locally known as Moujean Tea. Apparently nearest to *L. reticulata* Pers.

Mecardonia peduncularis (Benth.) Small.

Coastal thickets and clearings, Eight Mile Rocks and Pinder's Point, Great Bahama (*Britton & Millspaugh, 2356* and *2507*). Apparently identical with the Texan plant.

Cestrum bahamense sp. nov.

A shrub 3 m. high or less, glabrous throughout, the bark light gray. Leaves ovate to ovate-elliptic, pale green on both sides, but slightly darker green above than beneath, 5–10 cm. long, 5 cm. wide or

less, firm in texture, acute at both ends, or the apex obtusish, faintly 7–9-veined on each side of the mid-vein, which is rather prominent on the under side and impressed on the upper; petioles slender, 1–1.5 cm. long; cymes (?) axillary, few–several-flowered, their peduncles much shorter than the petioles; pedicels 1.5–3 mm. long; calyx oblong-campanulate in flower, 4 mm. long, its teeth triangular-lanceolate, 1.5 mm. long; corolla-tube greenish-yellow, 9–13 mm. long, narrowly obconic, its lobes lanceolate, acuminate, purplish, 4–5 mm. long, white-lanose within; stamens inserted high up on the tube of the corolla just below the lobes, the free part of the filament scarcely longer than the anther; berry blue-black, shining, obovoid, about 12 mm. long, 5–6 mm. thick; fruiting calyx broadly obconic, loosely enclosing the narrowed base of the berry.

Heretofore referred to *C. pallidum* Lam., the type locality of which is Jamaica, but clearly distinct from that species; abundant in coppice and scrub land. Abaco (*Brace, 1521, 1567, 1710*); Great Bahama (*Britton & Millspaugh, 2603*); Great Sturrup Cay, Berry Islands (*Britton & Millspaugh, 2267*, type); New Providence (*Brace, 46; Cooper, 60; Curtis, 121; Britton & Brace, 767; E. G. Britton, 3289*); Andros (*Northrop, 432*).

GERARDIA SPICIFLORA Engelm. Bost. Jour. Nat. Hist. 5: 227. 1845.

This plant is frequent on saline soil on New Providence, and has been recorded from the Bahamas as *G. maritima* Raf., from which it differs in becoming twice as tall, more slender and usually less fleshy; its calyx-teeth are triangular and acute, rather than blunt as in *G. maritima* and the tube of the corolla is more slender; its seeds are one third smaller than those of *G. maritima* and their reticulations smaller. It ranges from the Bahamas to Cuba and through the Gulf States to Texas, its type locality (margins of brackish ponds, Galveston Island).

BAHAMAS: Abaco (*Coker, 565*); New Providence (*Coker, 300, Britton & Brace, 522*); Andros (*Northrop, 751*, specimen imperfect).

CUBA: Batabano (*Shafer, 142*).

FLORIDA: (*Chapman*); Pine Island (*Tracy, 7607*); Sanibel (*Hitchcock, 245*); near Appalachicola (*Biltmore Herb., 2463b*); shore of Indian River (*Curtiss, 5767*); St. Mark's (*Rugel*); Titusville (*Nash, 2299*).

MISSISSIPPI: Breton Island (*Lloyd & Tracy, 88*).

TEXAS: (*Drummond*).

GERARDIA DOMINGENSIS Spreng. Syst. **2**: 807.

This is readily distinguished from the preceding species by its short pedicels, not longer than the calyx, the bracts often as long as the flower. Its type locality is Santo Domingo, and it occurs in Cuba (*Wright, 2991; Combs, 443*) and on the Bahamas (Eleuthera, *Coker, 355;* Andros, *Northrop, 459*); Abaco (*Brace, 1619, 1830*); Great Bahama (*Britton & Millspaugh, 2594*).

AFZELIA CASSIOIDES (Walt.) Gmel.

Pine lands, Eight Mile Rocks, Great Bahama (*Britton & Millspaugh, 2457*).

BONTIA DAPHNOIDES L.

Palmetto lands, Barnett's Point, Great Bahama (*Britton & Millspaugh, 2626*).

ERNODEA COKERI Britton; Coker, in Shattuck, Bahama Islands, 264. 1905.

Stems very slender, trailing, finely pubescent, 3 dm. long or longer, much branched. Leaves narrowly linear, 2–3 cm. long, 1–1.5 mm. wide, rough-pubescent, very acute, 1-nerved, narrowed at the base into very short petioles; stipules about 2 mm. long; fruit somewhat obovate, sessile, about 4 mm. long, crowned with the 5 subulate calyx-lobes, which are 6 or 7 mm. in length.

Which Point, Abaco (*Coker, 564,* type); Marsh Harbor, Abaco (*Brace, 1805, 1821*); Great Bahama (*Britton & Millspaugh, 2370, 2681*).

GUETTARDA KRUGII Urban.

A small tree, up to 4 m. high, abundant in the scrub lands on Inagua, and erroneously referred to *G. calyptrata* by Mr. Hitchcock (*Nash & Taylor, 918, 919, 1309, 1369*); also on Great Exuma (*Britton & Millspaugh, 3022*); Great Guana Cay (*Britton & Millspaugh, 2870*); Abaco (*Brace, 1582*).

CAYAPONIA RACEMOSA (Sw.) Cogn.

Coppice, Old Kerr's Point, Abaco (*Brace, 2014*); clearing, Lake Cunningham Road, New Providence (*Britton, 120*).

EUPATORIUM CAPILLIFOLIUM (Lam.) Small.

Widely distributed in the Bahamas, in pine and scrub lands, sink-holes and moist open places, sometimes invading cultivated ground as a weed.

CHRYSOPSIS GRAMINIFOLIA (Michx.) Nutt.

Frequent in pine lands on Great Bahama (*Britton & Millspaugh, 2397, 2669*).

ASTER ADNATUS Nutt.

This abundant species of the pine-lands of southern Florida occurs frequently in those of the vicinity of Eight Mile Rocks, Great Bahama (*Britton & Millspaugh, 2385*).

STEMMODONTIA TRILOBATA (L.) Small (*Wedelia carnosa* Rich.).

Hitherto known only in the Bahamas from roadsides on New Providence (*Brace, 392; Coker, 26; Britton, 3442*). Perhaps introduced from Cuba.

Stemmodontia bahamensis sp. nov.

Perennial, densely strigose-pubescent all over, pale green, 6–10 dm. tall, the branches striate. Leaves lanceolate to ovate, 5–12 cm. long, 1.5–3 cm. wide, acute to long-acuminate at the apex, narrowed at the base, rather firm in texture, sparingly low-serrate or entire, 3-nerved above the base, the short stoutish petioles mostly not over 1 cm. long; heads solitary or 2 or 3 together, on erect peduncles 2 or 3 cm. long; outer bracts of the involucre oblong to ovate-oblong, apiculate or acutish, about 9 mm. long, faintly many-nerved, a little longer than the inner; rays bright yellow, oblong, 1 cm. long or less, emarginate, about 3 times as long as wide; achenes linear, appressed-pubescent, at least 3.5 mm. long.

Coastal thickets and scrub lands, New Providence (*Britton & Brace, 302*, type; *Britton, 77, 3374; Curtiss, 30; Brace, 266*); abundant in scrub land near Georgetown, Great Exuma (*Britton & Millspaugh, 2929*). Related to **S. asperrima** (Spreng.) Britton [*Buphthalmum asperrimum* Spreng.; *Anomostephium buphthalmoides* DC., *Wedelia buphthalmoides* Griseb.] of the Windward Islands, and hitherto confused with it.

Anastraphia cuneifolia Greenman, sp. nov.

Shrub 1–2 m. high, much-branched; stem and branches covered with a light gray bark. Leaves obovate-cuneate, 1–2 cm. long, 0.5–1.2 cm. broad, revolute-margined, sparingly spinulose-dentate in the terminal portion, entire and narrowed below the middle into the petiole, slightly puberulent above in the early stages but soon glabrate and rather conspicuously reticulate-veined, densely and permanently white-tomentose beneath; petioles 3–5 mm. long, tomentose; heads few, about 2 cm. long, sessile, mostly terminating the ultimate branchlets, 5-flowered; involucre narrowly campanulate, 8.5–10 mm. long; bracts of the involucre 5–6-seriate,

triangular-ovate to lance-linear, acute, externally arachnoid-tomentulose, brownish, slightly spreading at maturity: mature achenes 3.5–4 mm. long, pubescent; pappus about 13 mm. in length, persistent, tawny.

Camfield Bay to Cabbage Pond, Inagua (*Nash & Taylor 1295*, October 22, 1904, type; hb. N. Y. Bot. Gard. and hb. Gray); Miner's Tent to Balsam Hill, Inagua (*Nash & Taylor*, *1259*).

The species here described is most nearly related to *A. intertexta* Wr.; the chief differences being the obovate-cuneate leaves with fewer spinulose teeth, shorter heads, involucre and pappus, and 5 instead of 10 flowers in the head.

ANASTRAPHIA BAHAMENSIS Urban.

Rocky coppice near Georgetown, Great Exuma (*Britton & Millspaugh*, *2981*). Determined by Dr. J. M. Greenman.

CARDUUS PINETORUM Small.

Eight Mile Bay, Abaco (*Brace*, *1851*); Eight Mile Rocks, Great Bahama (*Britton & Millspaugh*, *2466*).

LACTUCA INTYBACEA Jacq.

Cultivated ground near Georgetown, Great Exuma (*Britton & Millspaugh*, *3132*); reported by Hitchcock from Inagua. Rare in the Bahamas.

New American Coralline Algae

By M. Foslie and M. A. Howe

The material on which the following descriptions are based has been secured by the junior author of the present paper on expeditions sent out by the New York Botanical Garden to Bermuda, Florida, the Bahama Islands, and Porto Rico. The coralline algae, especially the crustaceous kinds, have been, for more or less obvious reasons, largely neglected by collectors, and the species of the West Indian region in particular are still very imperfectly known. Indeed, it may be said that any attempt to arrange and classify the unarticulated corallines in general can be considered as only tentative until the three forms of reproductive organs, which all species are supposed to possess, are known for each species. In some of the species and subspecies described below as new, the material is entirely sterile; in others, empty conceptacles alone have been found; yet the plants, as a rule, possess such well-marked distinctive characters in outward form or internal structure that we believe our descriptions and photographs will prove sufficient for their recognition.

The gross specimens and microtome-sections from which the published photographs have been taken are deposited in the museum of the New York Botanical Garden, though carefully selected duplicates, both of the gross specimens and of the microscopic preparations used, are in the possession of the senior author at Trondhjem; in two cases (*Lithophyllum bermudense* and *Lithothamnion fruticulosum aemulans*), the single original specimen was broken into two nearly equal parts after photographing, and a half is in the possession of each of the authors. The photomicrographs were taken by Dr. Edward Leaming of the College of Physicians and Surgeons, New York. Following, are descriptions of the species and forms which we believe to be hitherto unrecognized:

Archaeolithothamnion dimotum sp. nov.

Thallus forming crusts 0.5–1.0 mm. thick, closely adherent to the substratum, destitute of proper excrescences, though often rough and irregular through covering irregularities in the substratum: perithallic cells in vertical section partly quadrate, 6–11 μ in diameter, and partly vertically elongated, attaining a length of 15 μ, now and then with longest diameter horizontal, minute intermediate

cells rather numerous: sporangia 40–60 μ broad, 70–85 μ long, exclusive of apiculum, the latter 15–25 μ long. (PLATE 80, F. 1; PLATE 87.)

PORTO RICO: On rocks at low-water mark, Lemon Bay, near Guánica (*no. 2667*).

Among recent species of this genus, hitherto known, *Archaeolithothamnion dimotum* stands nearest *A. erythraeum* (Rothpl.) Fosl., but, is, in fact, more closely connected with the fossil species *A. curasavicum* (K. Mart.) Fosl. The latter seems to have grown in the same manner and the crust is of about the same thickness as in *A. dimotum*. In other respects, also, the two species are closely allied, except that the cells in *A. dimotum* seem to be generally a little smaller than in *A. curasavicum*.* According to a section of *A. curasavicum* which Professor K. Martin kindly sent for examination, the cells in some parts of the crust are of the same shape and size as in *A. dimotum*, but in other parts they are frequently larger, attaining a length of 20 μ, though often less. *A. curasavicum* is "aus zweifellosen Kreide-Ablagerungen herkünftig," according to a kind communication from Professor Martin; *A. dimotum* shows, in our opinion, sufficient diversity in structure to be considered distinct, even though only a single and perhaps poorly developed specimen of it has been seen; it is the first recent species of the genus known from America.

Lithothamnion mesomorphum ornatum var. nov.

Thallus much more delicate than in the type, only 150–200 μ thick, proliferations smaller: hypothallic (medullary) cells 11–20 × 7–11 μ, those near the lower surface often very narrow, 15–25 μ × 3–6 μ with large intercellular spaces; perithallic cells (towards upper surface) mostly rounded or subquadrate-oblong in vertical section, 4–9 μ in diameter. (PLATE 80, F. 2; PLATE 90, F. 2.)

BAHAMAS: Cave Cays, Exuma Chain, low littoral on a rock-shelf under an overhang (*no. 4021*).

The plant is yellowish-pink or salmon-colored when living. All the specimens examined are apparently sterile, yet we believe that they are to be looked upon as representing a variety of *Lithothamnion mesomorphum* Fosl. (New Melob. 5. 1901), originally described from Bermuda. In habit, the plants approach delicate forms of *L. lichenoides*.

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*Martin, K. Bericht über eine Reise nach Niederlandisch West-Indien und darauf gegründete Studien. II. Geologie. p. 26. Leiden, 1888.

Lithothamnion fruticulosum aemulans var. nov.

Forming an irregularly nodulose crust 10–15 mm. thick, branches mostly 2–5 mm. long, 1.5–3.0 mm. in diameter, tuberculate, much anastomosed: hypothallic cells subquadrate, mostly 14–20 μ × 9–16 μ; perithallic cells usually subquadrate, 6–10 μ in diameter or vertically elongated, up to 15 μ long: conceptacles of sporangia 400–500 μ in diameter when seen from above. (PLATE 81, F. 1, 2.)

PORTO RICO: San Juan, near low-water mark (*no. 2237*). The single specimen seen formed a free-lying nodule or pebble 10 cm. long and 3.5–4.5 cm. in diameter; the plant surrounds and entirely encloses a flattened coral axis, the two shorter diameters of which measure about 8 and 16 mm. The primary crust and the succeeding branches are so much anastomosed and overgrown that the basal portions to a height of 6–10 mm. look almost solid, with numerous small lacunae, however. The cells of various strata, especially of the overgrowing hypothallia and the cells which occupy the overgrown conceptacles are densely charged with amylum-bodies, which, in a gross section, appear to give an added whiteness to the parts in which they occur. The plant resembles in habit forma *crassiuscula* Fosl. (Bot. Tidsskrift **24**: 17. 1902), though the conceptacles are a little smaller. It is possible that it represents a distinct species closely allied to *L. fruticulosum*, but it cannot be kept separate at present. The specimen is burdened with foreign bodies and much water-worn.

Goniolithon Rhizophorae sp. nov.

Thallus forming crusts attaining a thickness of about 0.4–1.0 mm. on roots of *Rhizophora*, developing branches about 1 mm. in diameter, these mostly remaining simple and reaching sometimes a height of 5–10 mm.: hypothallic cells in part subquadrate and 12–15 μ in diameter and in part elongated and then 12–30 μ × 8–15 μ; perithallic cells somewhat variable, partly subquadrate or rounded and 8–15 μ in diameter, partly elongated vertically and then up to 24 μ long, now and then a little elongated in the horizontal direction: conceptacles conical, 0.8–1.0 mm. in diamater when seen from above. (PLATE 82, F. 2.)

BAHAMAS: Stocking Island, Great Exuma (*no. 4170*), on roots of *Rhizophora Mangle* near the low-water line.

Goniolithon Rhizophorae stands on the one hand near *Goniolithon Notarisii propinquum* Fosl., and on the other it is closely connected with *Goniolithon strictum* Fosl. Specimens destitute of branches are difficult to separate from the former species and

those provided with branches resemble young attached specimens of *G. strictum*, though the crust when present in the latter seems usually thinner than in *G. Rhizophorae* and shows some differences in structure.

Goniolithon strictum nanum var. nov.

Branches crowded, subfastigiate, terete or subcompressed, 0.8–1.0 mm. in diameter, mostly 5–10 mm. high: otherwise as in typical *Goniolithon strictum* Fosl. (Plate 82, f. 1.)

Porto Rico: San Juan, mostly in shallow tide-pools (*no. 2235*).

This delicate form corresponds to *Goniolithon frutescens subtile* Fosl. (Siboga-Exped. Monog. 61: 53. *pl. 10. f. 12, 13*) and is possibly identical with it, as it is not altogether certain that the Atlantic *G. strictum* can be kept separate from the Pacific *G. frutescens*.

Goniolithon accretum sp. nov.

Thallus light-rose when living, or, when growing in exposed places, commonly decolorate or very light rose-gray or sometimes of a slightly yellowish slate-color, forming thin crusts of indefinite shape, very closely adherent to the substratum and following its inequalities, mostly 80–340 μ thick, though sometimes reaching 1.3 mm. (including the older overgrown strata): hypothallic cells in a vertical section subquadrate-oblong, for the most part with the longer diameter horizontal or oblique, 14–27 μ × 8–14 μ; perithallic cells subquadrate or roundish, 4–9 μ in diameter, rather often vertically elongated and reaching 10 μ in length, sometimes with the longer diameter horizontal; heterocysts 20–25 μ long: conceptacles (of sporangia?) about 300–400 μ in diameter. (Plate 85, f. 2; Plate 91.)

On exposed surf-beaten rocks or sometimes on pebbles in more protected places.

Florida: Sands Key (*no. 2920a*, type).

Bahamas: Great Sturrups Cay (*nos. 3627* and *3629*); probably also *no. 3295* from Dollar Harbor, South Cat Cay.

Nos. 1994 (*p.p.*) and *2194*, from Santurce (San Juan), Porto Rico, are possibly to be referred to the same species.

The specimens seen are mostly sterile and the species is perhaps not a well-defined one. It stands near *Goniolithon Notarisii* (Duf.) Fosl. but diverges in the apparently smaller and less prominent conceptacles and more especially in the smaller and frequently thinner-walled perithallic cells. The cells sometimes even remind one of those of *Lithophyllum decipiens* Fosl.

Lithophyllum (?) munitum sp. nov.

Thallus brownish-red when living, forming irregularly lobed crusts with densely crowded processes or branches, these either simple and verrucose, 2–4 mm. in diameter, or irregularly and sparingly divided, the branches reaching a length of about 4 mm., often with knobby excrescences and somewhat anastomosing: cells of hypothallium mostly 12–24 μ × 5–8 μ; those of perithallium subquadrate or rounded in vertical section, 5–9 μ in diameter, in part slightly elongated horizontally or vertically and in latter case reaching a length of 11 μ: conceptacles (of sporangia?) convex but very little prominent, about 300 μ in diameter when seen from above. (Plates 86, 88, 89.)

Bahamas: Cave Cays, Exuma Chain (*no. 4023*).

The specimens were growing on a coarse dead coral near the low-water mark under shelving rocks. They form very irregular masses, attaining finally a thickness of 3–6 cm. The irregularities are doubtless in part accounted for by the fact that the plant encloses various other organisms, shows numerous canals made by animals, and in parts a *Goniolithon* (*strictum?*) is intermingled or superposed. A section shows numerous overgrowing hypothallia and overgrown conceptacles are abundant. No sporangia have been seen and the determination of the genus therefore still remains uncertain. Provisionally, it may be placed as above and in the section *Eulithophyllum*. In habit the species somewhat resembles *Lithothamnion fruticulosum aemulans*. It also approaches certain stunted forms of *Lithophyllum daedaleum* Fosl. & Howe; in structure, it is more closely allied to *Goniolithon accretum* Fosl. & Howe, lacking, however, heterocysts.

Lithophyllum bermudense sp. nov.

Thallus forming crusts 1–2 mm. thick on calcareous pebbles: hypothallium showing in vertical section a solitary row of oblique cells, these 25–50 μ × 9–15 μ; perithallic layers composed of vertically elongated cells 15–45 μ × 6–18 μ, mostly 2–6 times longer than broad, with here and there short horizontal series of subquadrate cells about 9–15 μ in diameter, cells all with conspicuous lateral as well as terminal intercellular connections: conceptacles (of sporangia ?) convex or subhemispherical, 400–600 μ in diameter when seen from above, often, however, but little prominent, orifice single. (Plate 81, f. 3; Plate 85, f. 3; Plate 92.)

Bermuda: Spanish Point (*no. 199*, type).

Florida: Sands Key (*no. 2920b*).

The specimens seen exhibit uneven surfaces, looking as if rather

crowded wart-like excrescences 3–6 mm. in diameter were developed, but a closer examination shows that most, at least, of these are caused by irregularities of the substratum, by covering up animals, etc. Including the animal growths that it covers or surrounds and its own older strata, the crust develops in places a thickness of 8 or 9 mm. The few conceptacles examined were empty and it is not wholly certain whether they bore sporangia or cystocarps.

The species stands nearest, on the one side, to *Lithophyllum papillosum* (Zanard.) Fosl.; and, on the other hand, in structure and in character of the conceptacles, it makes an approach to *Lithophyllum* (*Dermatolithon*) *macrocarpum* (Rosan.) Fosl. It is, however, easily separated from both. Numerous lateral connecting processes occur between the cells. It is, not unlikely, to be referred to the subgenus *Dermatolithon.*

Lithophyllum daedaleum sp. nov.

Subgenus *Eulithophyllum* Fosl. Rev. Syst. Surv. Melob. 17. 1900.

Thallus attached, forming thin crusts from which issue short, crowded, repeatedly subdichotomous, frequently somewhat anastomosing, subfastigiate branches, these about 2 mm. thick, with the apices roundish-thickened, truncate, or more frequently depressed in the center, or subconcave and irregularly dilated, surface of mass when well developed appearing molariform-daedaleoid: conceptacles of sporangia convex, little prominent, about 300 μ in diameter when seen from the surface. Primary crusts 0.5–2.0 mm. thick, smooth; branch-system reaching a maximum height of 6 cm., depressed apical expansions of fused molariform branches often 3–15 mm. broad; cells of surface 4–12 μ in diameter, those of perithallium and medulla cuboidal or subglobose to cylindrical-oblong, 8–36 $\mu \times$ 8–14 μ, long and short cells often regularly or irregularly alternating. (Plates 83, 84, 93.)

Porto Rico: On rocks that are much exposed to the surf, near low-water mark; Salinas Bay, near Guánica (*no. 2676*, type); near mouth of Guánica Harbor (*no. 2659*); Santurce (*no. 2193*); San Juan (*no. 2327*).

Lithophyllum daedaleum pseudodentatum var. nov.

Diverging from type in having many of the branches broadened upward, plano-compressed, or subflabelliform, sometimes attaining a width (including anastomoses) of 2 cm. (Plate 85, f. 1.)

Porto Rico: On surf-beaten rocks, low littoral, Salinas Bay, near Guánica (*no. 2675*).

Lithophyllum daedaleum belongs to that section of the genus which includes *L. Racemus* (Lamarck) Fosl., a group whose species, as at present conceived, appear to intergrade (*cf.* Corallinaceae Siboga-Exped. 60. 1904). Like others of the group, it may be considered a separate species, at least until the limits of variation of this and related forms are better known than at present. The species is especially allied to *Lithophyllum pallescens* Fosl. and *L. Kaiserii* (Heydr.) Fosl. It is extremely variable and sometimes approaches *L. retusum* Fosl. in habit. The variety *pseudodentatum* even resembles certain forms of *Lithophyllum dentatum* (Kütz.) Fosl.

The plant is at first firmly attached to the substratum by a rather thin, extended crust; as the branches develop, this crust seems sometimes to disappear, yet the plant retains a firm hold upon the substratum — at least, the collector has never seen specimens that have been naturally dislodged. In structure, there seems to be no limit between this species and *L. pallescens* and *L. Kaiserii*. Lateral intercellular connections are easily demonstrable in *L. daedaleum*, but they are by no means so conspicuous and numerous as in *L. bermudense*.

Lithophyllum Chamaedoris sp. nov.

Thallus forming dull-rose or purplish crusts 60–150 μ thick: basal cells in part subquadrate in a vertical section, 7–10 μ in diameter, in part horizontally elongated and attaining a length of about 12–13 μ; perithallic cells partly and most frequently subquadrate, 7–10 μ in diameter, often more or less rounded, partly elongated horizontally and then 10–12 μ × 8–10 μ, seldom 14 μ long, now and then with cells vertically elongated: conceptacles of sporangia convex or subconical, 150–200 μ in diameter; sporangia 2-parted, 50–60 μ × 30–40 μ. (PLATE 90, F. 1.)

BAHAMAS: Encircling the stalks of *Chamaedoris*, Cave Cays, Exuma Chain (*no. 4017*).

The species belongs in the section *Carpolithon* and is rather near *Lithophyllum marginatum* (Setch. & Fosl.) Fosl., described from the Pacific Coast of the United States.

Explanation of plates 80-93

PLATE 80

1. *Archaeolithothamnion dimotum*, natural size, (*no. 2667*).

2. *Lithothamnion mesomorphum ornatum*, natural size, (*no. 4021*). (A of the specimens except the one shown in the upper right-hand corner are of this variety.)

PLATE 81

1. *Lithothamnion fruticulosum aemulans*, natural size, (*no. 2237*).

2. The same broken in two, showing the *Lithothamnion* enclosing a coral axis.

3. *Lithophyllum bermudense*, natural size, (*no. 199*). The figure at the right shows the plant enclosing a pebble of coral sandstone, now broken in two. The figure at the left shows the crust of *Lithophyllum* separated from the pebble and with the inner surface toward the camera.

PLATE 82

1. *Goniolithon strictum nanum*, natural size, (*no. 2235*).

2. *Goniolithon Rhizophorae*, natural size, (*no. 4170*). The longest branches, sometimes reaching a height of about 10 mm., were unfortunately broken off before the photograph was taken.

PLATE 83

Lithophyllum daedaleum, natural size, (*no. 2676*, type). The fragment at the upper right-hand corner is turned in such a way as to show the latero-ventral surface of the cluster.

PLATE 84

Lithophyllum daedaleum, natural size, (*no. 2193*). The lower specimen represents a young condition of the species, bearing a few molariform branches and smaller elevations; the upper specimen shows an older form near the typical with the primary crust reduced or deficient.

PLATE 85

1. *Lithophyllum daedaleum pseudodentatum*, natural size, (*no. 2675*).

2. *Goniolithon accretum*, natural size, (*no. 2920a*, type). The upper end of the pebble is covered with *Lithophyllum bermudense* (*no. 2920b*).

3. *Lithophyllum bermudense*, natural size, (*no. 199*). Another view of a part of the same pebble shown in Plate 81, f. 3, exhibiting more of the surface of the *Lithophyllum;* a part of the crust, however, is broken away.

PLATE 86

Lithophyllum (?) *munitum*, natural size, (*no. 4023*), encrusting a dead coral. In the upper left-hand corner the *Lithophyllum* (?) is partly overgrown by a *Goniolithon*.

PLATE 87

Archaeolithothamnion dimotum. Photograph of a vertical section (decalcified) about 10 μ thick, magnified 165 diameters, showing sporangia. A portion of the upper surface has here unhappily been dislocated in the process of preparing the section, but this section was chosen for photographing because it showed the sporangia better than any other that was secured.

PLATE 88

Lithophyllum (?) *munitum.* Photograph of a vertical section (decalcified), magnified 17 diameters, showing overgrown conceptacles, etc. (free surface to the right).

PLATE 89

Lithophyllum (?) *munitum.* Photograph near the surface in a vertical section (decalcified), magnified 165 diameters, showing the numerous overgrown hypothallia, etc.

PLATE 90

1. *Lithophyllum Chamaedoris.* Photograph of a section (decalcified) through the *Lithophyllum* and the wall of the *Chamaedoris* stalk, magnified 165 diameters, showing conceptacle, form of cells, etc.

2. *Lithothamnion mesomorphum ornatum.* Photograph of a section (decalcified) through a proliferation and part of the main thallus, magnified 165 diameters. The ventral side shows the larger intercellular spaces.

PLATE 91

Goniolithon accretum. Photograph of a vertical section (decalcified) of *no. 2920a* (type), magnified 165 diameters. The thallus in *no. 2920a* is unusually thick and well-developed. The horizontal line near the middle represents a hypothallus, as is shown more clearly farther along on the same section, where the two layers become discrete. In no specimen other than *no. 2920a* have we observed superposed layers.

PLATE 92

Lithophyllum bermudense. Photograph of vertical section (decalcified) of *no. 199* (type), magnified 165 diameters. The dots on the cells mostly represent intercellular connections. The connecting processes are shown with especial clearness in the case of the elongated cells just above the overgrown conceptacle.

PLATE 93

Lithophyllum daedaleum. Photograph of vertical section (decalcified) of apex of a branch, magnified 165 diameters. Section made from the specimen shown at top of Plate 84 (*no. 2193*). (This photograph was obtained at a time when it was thought to make this specimen of *no. 2193* the type of the species; however, the structure, as exhibited here, does not seem to differ essentially from that of the type-number — *2676*).

Contributions to the Flora of the Bahama Islands. III *

By N. L. Britton

Marsilea Nashii Underwood, sp. nov.

Plants forming compact dense mats in dry soil. Stems short, slender, smooth or with a few appressed slender hairs, forming nodes at intervals of 3–10 mm.; leaves rising in clusters from short lateral branches the ends of which are enveloped in small tufts of fulvous tomentum; petioles slender, filiform, 5–8 cm. long; leaf-blades of the usual quadrifoliate type, the divisions narrow, cutlass-shaped, the distal end curved abruptly upwards and ending in a blunt point, 10–12 mm. long, 2 mm. wide, sparsely covered with white appressed hairs; sporocarps abundant, solitary on short (4 mm.) peduncles, compressed-oval, the dimensions averaging 7 × 4 × 2 mm.; raphe ending in a short, straight tooth with a second similar basal tooth 1 mm. beyond; surfaces covered with appressed hairs, becoming smoother with age; sporangia about 12 pairs, elongate-oval, 4 mm. long by 1 mm. thick, the gelatinous stalk 2.4 cm. long by 2 mm. wide (when expanded); macrospores about 8–10 in each sporangium, oval, 690–800 μ long by 540–620 μ wide; microspores numerous, nearly globose, 53–64 μ in diameter.

Inagua, growing at Smith's Thatch Pond, November, 1904 (*Nash & Taylor, 1411*). Said to be very abundant in sandy loam alternately dry and covered with a few inches of water.

Remarkable for the compact habit of growth and for the extremely narrow leaflets which recall those of *M. tenuifolia* from Texas, one of our rarest species. This is the first species to appear in the Bahamas and the third from the West Indies.

Tillandsia valenzuelana A. Rich.

On trees in coppice, Marsh Harbor, Abaco (*Brace, 1639*).

Sisyrinchium miamiense Bicknell.

Near West End, Great Bahama (*Brace, 3642*). The specimens have more numerous flowers than the type from Florida and are referred to this species with some hesitation. The genus is hitherto unknown from the Bahamas.

Polygonum hydropiperoides Michx.

Water-holes, West End, Great Bahama (*Brace, 3523*). Determined by J. K. Small.

* Continued from Volume 4, page 127.

Dondia insularis sp. nov.

Perennial, shrubby, much branched, 2 dm. high or less, the branches divaricately ascending. Leaves approximate, oblong, thick and fleshy, 2–4 mm. long, 1.5–2 mm. thick, obtuse, narrowed to a subsessile base; flowers axillary to the upper leaves, about 2.5 mm. broad; sepals ovate, obtuse; filaments shorter than the sepals.

In a salina, Grand Turk (*Nash & Taylor, 3873*, August 27–September 1, 1905). Habit of the Texan *D. conferta* Small, which has larger flowers, longer leaves and filaments longer than the sepals.

Sesuvium maritimum (Walt.) B. S. P.

In a sink-hole, Ship Channel Cay (*Britton & Millspaugh, 2752*).

Castalia pulchella (DC.).

Nymphaea pulchella DC. Syst. **2**: 51. 1821.

Nymphaea ampla pulchella Casp. in Mart. Fl. Bras. **4**^{2}: 161. 1878.

New Providence (*Brace, 381; Britton & Brace, 509*); Great Exuma (*Britton & Millspaugh, 3101*); Cat Island (*Coker, 434*); Inagua (*Nash & Taylor, 1460*).

This appears to be specifically distinct from *C. ampla* in the fewer petals and merely repand leaf-margin. Plants from New Providence are in cultivation at the New York Botanical Garden, and have only 6 petals or fewer, usually only 4; as observed by me at the locality near Southwest Bay, New Providence, no flower had more than 4. The rootstock of this species is nearly globular, and only about 3 cm. in diameter.

Pithecolobium obovale (A. Rich.) Wright.

Old Kerr's Point, Abaco (*Brace, 2017*).

Parkinsonia aculeata L.

Grand Turk (*Nash & Taylor, 3874*). Not otherwise known in the wild state from the Bahamas.

Cassia lucayana sp. nov.

A much-branched shrub, 1.5 m. high or less, the twigs densely pubescent, very leafy. Petiole 6–12 mm. long, somewhat pubescent, bearing a stout flat-topped gland below the lowest leaflets; rachis sparingly pubescent or glabrous; leaflets 4–9 pairs, coriaceous, glabrous, minutely papillate, inequilateral, ovate to ovate-oblong, sessile, obliquely cordate or subcordate at the base, obtuse

to acutish and distinctly cuspidate at the apex, 1–2 cm. long, 4–12 mm. wide, finely many-veined, the veins parallel, somewhat anastomosing; stipules lanceolate-subulate, 3–4 mm. long, strongly several-veined, persistent; peduncles 1 or 2 in the axils, 3–4 cm. long, pubescent; legume linear, flat, narrowed at the base, abruptly short-tipped, nearly glabrous or with a few scattered hairs when mature, 4–5 cm. long, 5–7 mm. wide, imperfectly septate between the seeds; seeds obliquely quadrate, compressed, dull, 4–5 mm. long, about 2 mm. broad.

Cay north of Wide Opening, Exuma Chain (*Britton & Millspaugh, 2774*, type); Little Galiot Cay, Exuma Chain (*Britton & Millspaugh, 2841*); Great Exuma (*Britton & Millspaugh, 3041*). Apparently related to *C. brachypoda*.

Cassia inaguensis Britton, Bull. N. Y. Bot. Gard. **3**: 443.

Grand Turk (*Nash & Taylor, 3829*). Legume linear, straight, flat, 3 cm. long, 3.5 mm. wide, sparingly pubescent with scattered hairs.

Cassia bicapsularis L.

Grand Turk (*Nash & Taylor, 3837*). Previously reported from the Bahamas by Grisebach as collected by Swainson.

Tricera bahamensis (Baker).

Buxus bahamensis Baker, in Hook. Ic. Pl. *pl. 1806*.

Low coppices and scrub lands, widely distributed. New Providence (*Curtiss, 138; Britton, 87; Coker, 68; Britton & Brace, 663*). Cay north of Wide Opening, Exuma Chain (*Britton & Millspaugh, 2800*). Great Exuma (*Britton & Millspaugh, 3083*). Watling Island (*Coker, 474*). Fortune Island (*Brace, 461*). Inagua (*Nash & Taylor, 1013*). Grand Turk (*Nash & Taylor, 3811, 3831*). Andros (*Northrop, 460*). The leaves vary from broadly oblong to oblong-obovate.

Picrodendron macrocarpum (A. Rich.).

Schmidelia macrocarpa A. Rich. in Sagra, Hist. Cuba **10**: 116. *pl. 30*. 1845.

Picrodendron baccatum var. *bahamense* Krug & Urban, Bot. Jahrb. **15**: 308. 1893.

Numerous specimens indicate that the Cuban and Bahamian trees of this genus are identical, and that they are specifically distinct from *P. baccatum* (L.) Krug & Urban, *loc. cit.*, which is known to me only from Jamaica. This conclusion differs from that of Prof. Urban, who considered the Cuban and Jamaican plants conspecific

and the Bahamian one different. Besides the blunt leaves and ovoid fruit attributed to the Bahamian tree by him, it has stouter and much shorter fruiting pedicels than *P. baccatum*, and the foliage is much paler green. Dr. Millspaugh and I obtained a large quantity of its fruit last year on Great Guana Cay, Exuma Chain, and a comparison of it with that of *P. baccatum* recently sent by Hon. Wm. Fawcett from Jamaica satisfactorily determines them to be different. Specimens of *P. macrocarpum* in our collections are as follows.

Cuba: (*Rugel, 644; Wright, 2275*).

Bahamas: Andros (*Northrop, 453*); Abaco (*Brace, 2029*); New Providence (*Brace, 476*); Eleuthera (*Coker, 352*); Great Guana Cay (*Britton & Millspaugh, 2895*).

Maytenus lucayana sp. nov.

A white-barked shrub, the twigs angular. Leaves alternate orbicular-ovate, 1.5–3 cm. long, 1.5–2.7 cm. wide, coriaceous, rounded at the apex, cordate at the base, shining above, dull beneath, bright-green, the midvein slender and impressed in both surfaces, the few lateral veins more slender and similarly impressed, the stout petiole only 1–1.5 mm. long; pedicels solitary or few together at defoliated axils, about 2 mm. long; petals not seen; calyx-lobes ovate, acute, nearly 1 mm. long; young fruit ovoid, pointed, tipped by a style 0.5 mm. long; stigmas 2.

Rocks on margins of pond, West End, Great Bahama, April 18, 1905 (*Brace, 3525a*). Nearest *M. buxifolia*.

Parthenocissus quinquefolia (L.) Planch.

Climbing on trees and shrubs in coppices and scrub lands. Great Bahama: Eight Mile Rocks (*Britton & Millspaugh, 2436*); West End (*Brace, 3628, 3653*). Abaco: Butler Bay (*Brace, 1519*); Marsh Harbor (*Brace, 1846*). New Providence: (*Northrop, 322*); Southwest Bay (*Britton & Brace, 479*). Great Exuma: Sink-holes near Georgetown (*Britton & Millspaugh, 3128*).

Mr. Rehder in Sargent's "Trees and Shrubs," 1: 184, refers the Bahama plant to *P. quinquefolia latifolia* (Tausch) Rehder, citing its distribution also as Southern Florida and Cuba, and remarking that this differs from the typical *P. quinquefolia* in having shorter and more numerous ramifications of the tendrils, generally broader leaves and a more elongated inflorescence, but none of these characters hold constant in our series of specimens and I can

not regard the northern and southern forms of the species as distinct. As seen by me on New Providence the calyx and pedicels are red or scarlet (*Britton & Brace, 479*). I agree with Mr. Rehder in considering the Cuban and South Florida plant the same, having collected it in both regions; our Cuban specimens are from the vicinity of Matanzas (*Rugel, 657; Britton & Wilson, 63*), and Batabano (*Shafer, 228*).

Myroxylon bahamense sp. nov.

An intricately branched shrub or small tree 4 m. high or less, the trunk and larger limbs densely armed with branched spines 5 cm. long or less. Wood yellowish-white, very hard and dense; twigs armed with subulate spines 1.5 cm. long or less; leaves ovate or oblong to oblanceolate, coriaceous, 6–30 mm. long, scarcely shining above, dull and paler green beneath than above, entire or with 1 to 4 blunt teeth, the apex acute, the base rounded or narrowed, the petiole about 1 mm. long; fruit obovoid-oblong, obtuse, 6 mm. long, 3 mm. in diameter.

Great Bahama: Scrub lands, Eight Mile Rocks (*Britton & Millspaugh, 2430*, type); same locality (*Brace, 3691, 3711, 3736*). Abaco: (*Coker, 562*); Marsh Harbor (*Brace, 1650*); Cherokee Sound (*Brace, 1972*). New Providence: (*E. G. Britton, 3405*).

Myroxylon ilicifolium (Northrop) (*Xylosma ilicifolia* Northrop, Mem. Torrey Club 12: 51, *pl. 12*), differs in having larger leaves distinctly shining above, the teeth and apex pungently pointed, and the fruit globose; it is abundant in coppices on New Providence and occurs also on Andros, but is not yet known from either the northern or the southern Bahamas.

Opuntia lucayana sp. nov.

Related to *O. Dillenii* and *O. Tuna* and growing with them. Stems ascending, often forming dense clumps; joints various, linear-oblong to obovate, often 5 dm. long, 10–15 cm. wide, olive-green, slightly lustrous, more or less crenate, about 1.5 cm. thick, knobbed at the areoles; areoles distant, nearly 1 cm. broad, white-velvety; glochides numerous, yellow, 6 mm. long or less, mostly borne at the upper margins of the areoles; spines 3–8 at each areole, light-yellow, flattened on the upper side, subulate, straight, often somewhat twisted, the longer ones 12 cm. long or less; flowers yellow, 7–8 cm. broad; stamens about half as long as the petals; ovary narrowly pyriform, 4–5 cm. long, its upper areoles bearing 1–3 subulate pale-yellow spines 2.5 cm. long or less which are sometimes persistent on the fruit; berry pyriform, 5–6 cm. long, 2–3 cm. in diameter.

Grand Turk (*Nash & Taylor, 3834*, type; *3833, 3841*). *O. Dillenii* has stouter shorter dark-yellow or yellow-brown spines. *O. Tuna* has much shorter nearly terete spines.

Limonium bahamense (Griseb.).

Statice bahamensis Griseb. Fl. B. W. Ind. 389. 1861.

Grand Turk (*Nash & Taylor, 3882*). Abundant in a salina. Originally collected by Hjalmarson in Turk's Islands, perhaps at the identical locality. Our specimens are much larger than his, reaching 3 dm. in height.

LUCUMA SERPENTARIA H. B. K.

Coppice near Nassau, New Providence (*Britton & Brace, 834*); Deep Creek, Andros (*Northrop, 703*).

Limnanthemum aureum sp. nov.

Rootstock 1 cm. thick, 3–4 cm. long. Stolons rather slender, purple-dotted, 2–3 dm. long, or longer, bearing a petioled floating leaf and an umbel of slender-pedicelled flowers at its summit but no tufts of tubers; leaves subpeltate, floating, ovate-orbicular, 5 cm. long or less, entire, or irregularly repand, thick, dull-green above, purple and densely dotted beneath, the basal sinus narrow, acute, or the obtuse lobes somewhat overlapping; petioles stout, 2–4 cm. long, inserted on the leaf-blade 1–3 mm. from the sinus; umbel several-flowered; pedicels slender, 3–5 cm. long in fruit; sepals oblong-lanceolate, acutish, 5–6 mm. long; corolla-segments about 8 mm. long, golden-yellow, their margins fimbriate; capsule oblong-ovoid, as long as the sepals; style subulate, persistent, 2–3 mm. long; seeds compressed-globose, wingless, smooth, 1 mm. broad and about one half as thick as wide.

In a slightly brackish pond near Georgetown, Great Exuma (*Britton & Millspaugh, 2974*). Apparently nearest *L. Grayanum* Griseb., of Cuba, which has larger flowers and leaves, sepals longer than the capsule, and tuberculate seeds.

PLUMIERA BAHAMENSIS Urban, Symb. Ant. 1: 387.

The species is based on *Eggers 3918*, from Acklin Island. It is represented in the Kew Herbarium by *Brace 472*, from Fortune Island; this specimen shows the follicle to be 10 cm. long, 1.2 cm. wide, short-tipped.

Metastelma inaguensis Vail, sp. nov.

A glabrous climbing vine. Stems slender, terete; leaves opposite, 2–4 cm. long, 5–8 mm. wide, or on older stems fascicled at the ends of short modified branches; blades varying from obovate,

oblong-obovate or linear-obovate to linear-lanceolate, obtuse, rounded and apiculate at the apex, tapering to a short petiole (or when linear-lanceolate acute at each end), somewhat thick and coriaceous, but distinctly veiny, yellowish green; cymes short-peduncled (2–3 mm.), about the length of the pedicels; calyx-segments ovate, obtuse, glabrous; corolla deeply 5-parted, the segments 3–3.5 mm. long, oblong or linear-oblong, obtuse, glabrous outside, papillose-puberulent except in the center and towards the base within; crown-segments subulate, acute, attached to the base of the flat gynostegium and connate with it to the base of the short column; pollinia oblong. Follicles not seen.

Near Salt Ponds, Inagua (*Nash & Taylor*, *913*, type); Blakeville, Inagua (*Nash & Taylor*, *1114*).

Two other collections (*Nash & Taylor*, *942* and *1106*) from the same region are referred here, and the description has been made to include them; they may, after further study, be found to be distinct species.

Nearest to *Metastelma bahamense*, from which it differs in the shape and width of the leaves and much more numerous flowers.

BONTIA DAPHNOIDES L.

Grand Turk (*Nash & Taylor, 3778, 3818*). Previously known from Great Bahama.

Aster lucayanus sp. nov.

Related to *Aster concolor* L. Rootstock short, thick, tuber-like. Leaves strongly reticulate-veined, entire, sessile (basal ones not seen), the lower oblanceolate, obtuse, those above the middle of the stem lanceolate to oblong-lanceolate, acuminate, 2–3.5 cm. long, 5–8 mm. wide, those of the inflorescence similar, smaller; heads racemose or racemose-campanulate, about 2 cm. broad; peduncles slender, sericeous; involucre turbinate-campanulate, its bracts loose, narrowly oblong-lanceolate, acuminate, sericeous, the inner 5–7 mm. long; rays purple, 2 mm. wide; achenes sericeous, 3 mm. long, half as long as the whitish pappus.

Pinelands, Eight Mile Rocks, Great Bahama (*Britton & Millspaugh*, *2448*, type); same locality (*Brace*, *3673*). Differs from *A. concolor* in the strongly reticulate acuminate leaves and narrower involucral bracts.

I am aware that Professor Greene (Leaflets 1: 5) has indicated *A. concolor* as a generic type, *Virgaria concolor* (L.) Raf., but I am not prepared to accede to this proposition.

A Revision of the North American Vernonieae

By Henry Allan Gleason

Several years ago it became apparent that certain species of *Vernonia* abundant in the western states had been so confused in various publications that satisfactory identification of them was almost impossible. Extensive field-work and detailed study of these doubtful species was alone insufficient to solve all the difficulties connected with them, so the investigation was extended first to include all the species of the United States and finally all the North American species of the tribe Vernonieae to which the genus *Vernonia* belongs. As far as possible the geographic-morphological method of Wettstein has been used, with results that it is hoped will prove of some value. The work has been done for the most part in the herbarium of the New York Botanical Garden, and it is a pleasure to acknowledge the valuable aid and criticism given by Professor N. L. Britton, Professor L. M. Underwood and Dr. P. A. Rydberg. Herbarium facilities, assistance and suggestion have also been given by Mr. C. C. Adams, of the University of Michigan, Mr. Stewardson Brown, of the Academy of Natural Sciences of Philadelphia, Dr. B. L. Robinson and Mr. M. L. Fernald, of the Gray Herbarium, Mr. William R. Maxon, of the United States National Herbarium, and Director William Trelease, of the Missouri Botanical Garden.

The Vernonieae as a group are characterized by homogamous discoid heads, anthers sagittate at base, styles subulate, leaves alternate and corollas not yellow. The shape of the style-branches is of particular importance, especially in distinguishing certain members of the group from alternate-leaved Eupatorieae. The branches are approximately semi-cylindrical in section and taper regularly from the point of division to the apex. The stigmatic surface is on the inner flattened side; the outer side is covered with hairs. The genera *Rolandra* and *Spiracantha* are anomalous in having the style-branches much shorter than is usual, but the hairiness of the outer surface extends much below the point of division, indicating a possible fusion of originally separate branches. The white, red, pink, or purple corollas are usually regularly five-cleft. In *Elephantopus* the corolla is more deeply cleft on the inner side.

In *Stokesia* the lobing of the corolla is deep, and the limb is flattened out to resemble a ray. *Piptocarpha* alone has anthers briefly caudate at base. Opposite leaves are reported for a few species, and in *Lachnorhiza* the leaves are all basal. The majority of the species are perennial herbs; others are shrubs, woody vines, or even small trees.

Bentham and Hooker recognized 40 genera and about 530 species. Hoffmann, in Engler and Prantl's Natürlichen Pflanzenfamilien, described 46 genera and estimated the number of species at 638. Including the additional genera recognized in this paper with Hoffmann's, the total would reach 51. The greater portion of the species, 380 according to Bentham and Hooker, 450 according to Hoffmann, belong to the type genus *Vernonia*. Probably 600 would be a safe estimate of the number of species in *Vernonia* alone.

The tribe is most abundantly represented in the Western Hemisphere, particularly in South America, where the abundance of individuals and variety of species is remarkable. They extend south to Argentina and north into the United States. In the Eastern Hemisphere numerous species are found in Africa and the warmer parts of Asia, and a few occur in Australia. None is found in Europe. Accepting Hoffmann's classification for the genera not occurring in North America, the distribution is shown in the following list. The figures in parentheses denote the approximate number of species.

Endemic to Africa: *Apodocephala* (2), *Bothriocline* (3), *Centauropsis* (3), *Corymbium* (7), *Erlangea* (2), *Gutenbergia* (7), *Herderia* (2), *Hoehnelia* (1), *Hoplophyllum* (2), *Msuata* (1), *Thysanurus* (1), *Volkensia* (1).

Endemic to Asia: *Adenoon* (1), *Lamprachaenium* (1).

Endemic to Australia: *Pleurocarpaea* (1).

Asia and Africa: *Ethulia* (1).

Endemic to South America: *Albertinia* (1), *Blanchetia* (1), *Chronopappus* (1), *Eremanthus* (18), *Gorceixia* (1), *Haplostephium* (2), *Heterocoma* (1), *Lychnophora* (17), *Lychnophoriopsis* (1), *Oiospermum* (1), *Piptolepis* (8), *Pithecoseris* (1), *Proteopsis* (2), *Sipolisia* (1), *Soaresia* (1), *Stilpnopappus* (15), *Telmatophila* (1), *Vanillosmopsis* (7).

Endemic to tropical America: *Oliganthes* (8), *Orthopappus*

(1), *Pacourina* (1), *Piptocarpha* (30), *Pseudelephantopus* (2), *Rolandra* (1), *Spiracantha* (1), *Struchium* (1).

Endemic to West Indies: *Piptocoma* (1).

Endemic to Mexico: *Bolanosa* (1), *Eremosis* (15), *Leiboldia* (3).

Endemic to the United States: *Stokesia* (1).

Both hemispheres: *Centratherum* (12), *Elephantopus* (14), *Lachnorhiza* (2), *Vernonia* (± 600).

It seems very probable that the Asiatic species included under *Centratherum* are not strictly congeneric with the American forms, and that the African plant referred to *Lachnorhiza* is rather to be placed in *Vernonia*.

The distribution of genera shows at once the two centers of distribution, one in Africa, the other in South America. Further details on geographical distribution will be given under the different genera.

The nomenclatorial history of the tribe begins with the first edition of Linnaeus' Species Plantarum in 1753, in which several species are described under various generic names. During the subsequent seventy years more than a hundred species were described and the principal genera were separated. Nevertheless the first consistent attempt at a logical classification is that of Lessing * in 1829. His first division, based on the presence or absence of so-called bracteoles, is no longer followed, but his subsequent divisions follow more or less closely the characters used by Bentham and Hooker and by Hoffmann. Lessing distinguished 28 genera, some of which are not properly included under the Vernonieae, and was also the first to bring together under *Vernonia* the various species described previously under *Serratula*, *Conyza*, *Achyrocoma* and *Lepidaploa*. Lessing continued his publications in Linnaea and in volume 6 gave a second conspectus of the tribe, recognizing the subtribes Vernonieae, Elephantopeae, Trichospireae, Rolandreae, Liabeae and Pectideae. His descriptions of species are full and his citations of synonymy usually very accurate.

Lessing's work was followed by that of De Candolle, who in 1836 monographed the tribe in volume 5 of the Prodromus. His Tribus Vernoniaceae was characterized by the subulate styles, and

* De Synanthereis Herbarii Regii Berolinensis. Linnaea 4 : 240–356.

under it the subtribe Vernonieae was separated by its homogamous discoid heads from the subtribe Pectideae with radiate heads. Under the former he distinguished the divisions or subdivisions Ethulieae and Heterocomeae, corresponding closely to Hoffmann's Vernonieae-Vernoninae, Albertinieae, including *Lychnophora* and the related genera, Elephantopeae, Rolandreae, and Bojerieae. Of the latter but one genus is at present retained in the tribe. De Candolle's treatment was the first and only monograph of the group as a whole.

Passing over a number of articles on single genera or groups of genera, the next extended classification is that of Bentham and Hooker.* They recognized two subtribes, Euvernonieae, with separate heads, and Lychnophoreae, with few-flowered heads aggregated in head-like glomerules. That this division is natural is shown by their geographical distribution, the latter subtribe being entirely American, with the exception of one species of *Elephantopus*. Further division of the Euvernonieae separates the series Sparganophoreae with 3 genera, having the achene surmounted by a cartilaginous ring; series Ethulieae, with 11 genera, in which the pappus is caducous or none; series Euvernonieae, with 6 genera, having a pappus of persistent bristles; and series Stilpnopappeae, comprising 9 genera with scaly pappus. The distinction between the last two series is in many cases an arbitrary one, and it seems doubtful if group characters can be drawn with certainty from the structure of the pappus. It seems evident that *Oliganthes*, for example, with scaly pappus, is much more closely related to *Eremosis* and through it to *Vernonia*, both with capillary pappus, than to *Stokesia*, with scaly pappus. In certain species of *Vernonia*, especially *V. expansa*, the bristles of the inner series are flattened, and in the same genus the outer series is sometimes capillary, sometimes scaly. However, nothing better than the classification used by Bentham and Hooker has yet been suggested, and their system is followed in detail by Hoffmann.* The only difference is in the status of *Lachnorhiza*, regarded in the first work as a genus, in the second reduced to a section of *Vernonia*. Seven additional genera, described since the publication of the Genera Plantarum, are included by Hoffmann.

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* Genera Plantarum 2: 165–238. 1873.

In this paper the general divisions follow Bentham and Hooker, but there is some deviation in the delimitation of certain genera formerly included under *Vernonia* and *Elephantopus*. The segregation followed here is by no means new, but has been practiced by various botanists since Lessing, and is abundantly justified by its results. The segregated genera, *Lachnorhiza*, *Eremosis*, and *Leiboldia* in the one case, and *Orthopappus* and *Pseudelephantopus* in the other, represent each a natural coherent group of species, sharply delimited by the structure of the pappus, the inflorescence, or some other morphological characters, and also with definite, characteristic geographical distribution.

The two subtribes, Euvernonieae and Lychnophoreae, while entirely distinct, nevertheless approach each other in certain genera. The genus *Vanillosmopsis*, of the former subtribe, is in particular closely similar in inflorescence to *Eremanthus* of the Lychnophoreae. *Eremosis* and *Oliganthes* also have heads with few flowers more or less closely aggregated in panicles and apparently also approaching the Lychnophoreae. It seems probable, therefore, that these genera represent most nearly the primitive type of the Vernonieae, and that from similar forms the evolution of the tribe has proceeded. The structure of the existing genera indicates that this evolution has been along at least five different general lines, three of them preserving the general feature of aggregated heads with few flowers, constituting the Lychnophoreae, and at least two tending toward an open inflorescence and many-flowered heads, the Euvernonieae. In the latter group one line has resulted in the Sparganophoreae, in which the achene is surmounted by a cartilaginous ring. In *Sparganophorus* the ring alone is present; in *Pacourina* a row of bristles is within the ring, showing the direction from which the genera have come. A second line of evolution is shown in the genus *Vernonia* and its relatives, where the changes have been principally in the inflorescence, ranging from scorpioid forms with relatively few-flowered heads to paniculate forms with frequently many-flowered heads. It is not clear whether the subtribes Ethulieae and Stilpnopappeae represent different lines of descent, or whether the differentiation of a pappus into forms composed entirely of scales, of similar bristles, or of dissimilar series is to be regarded as indicating distinct lines of

* Engler and Prantl, Die Natürlichen Pflanzenfamilien 4^5: 120–131. 1894.

development or merely lateral branches of the Euvernonieae line. In the Lychnophoreae one line begins with *Eremanthus* and is characterized by the spirally arranged scales of the involucre. The species of this group are entirely South American. A second includes the Elephantopeae, in which the scales are decussate, and the third leads to the genera *Rolandra* and *Spiracantha*, in which the corolla is merely toothed, and the style-branches are short.

Within these series the genera are distinguished by the structure of the pappus, which may be scaly, of scales and bristles, entirely of bristles in one or more similar series or two dissimilar series, or certain bristles may be peculiarly modified; by the number of flowers in each head, which is found to be constant for each species within certain limits; and by the character of the inflorescence.

In 1898 there appeared a paper by Wettstein * in which the author presented in a very convincing manner the insufficiency of morphological comparison alone in studying the relationships and probable phylogeny of species. He introduced examples showing how conceptions of species may be changed by combining distributional with morphological studies, and his own results, particularly on the genera *Gentiana* and *Euphrasia*, are proof of the value of his method. Stated in a somewhat modified form, his principle is that in a polymorphic genus the most nearly related species will occupy the same or adjacent areas, or will at least be connected by definite migration routes. In studying the relationships of the species of Vernonieae in North America this geographical method has been used as far as possible, and while in but few cases it led to conclusions which would not have been reached by morphological comparison alone, it has invariably confirmed the results of the latter in a most striking way.

Naturally an abundant supply of herbarium material or of field notes is necessary for successful application of Wettstein's method, so that the range of species, both geographically and ecologically, and their variation can be definitely ascertained. It is also important that the general phytogeographical relationships should be known, with some accuracy, of the floras in which the species to be investigated are found. Under phytogeographical relationships are included such features as centers of distribution, migration routes,

* Grundzüge der geographisch-morphologischen Methode der Pflanzen systematik.

natural barriers and boundaries. For the United States and portions of Mexico these have been established with considerable detail, but for the West Indies, Central America and the greater portion of Mexico practically nothing is known. For the West Indies it is known that a definite migration route, for both animals and plants, extends northward from South America through the Lesser Antilles to Porto Rico, Hispaniola, Cuba, the Bahamas, and Florida. Minor centers of distribution among these islands are not so evident, but the number of species limited either to one island or to a few neighboring ones is so great that each may almost be regarded as a center in itself. The intervening water is certainly an effective barrier to the ready dissemination of many species.

In Mexico and Central America a similar migration route extends from South America into the United States, and it is an easy matter to trace the species of Vernonieae in the United States back to an origin in Mexico. But definitely circumscribed floral areas can not yet be located there because of lack of data. The work is still further hampered by the variation in altitude which is so great as to become of the highest importance for the distribution of plants in its relation to temperature and rainfall.

There are in the eastern United States several well-marked centers of distribution from which the various species of the flora have spread and are still spreading. Some of these are entirely northern and consequently of post-glacial origin, and have nothing to do with a genus of such tropical origin as *Vernonia*. Four fairly well-marked centers, two in the southeast and two in the southwest, lie south of the glacial boundary, and have existed at least since inter-glacial time. Each of these is characterized by certain species of Vernonieae, some of which have migrated to the northward since the retreat of the glacial ice.

The Appalachian center is the best known of these four, although it was not until 1902 that Adams * first recognized it as such and discussed it in detail. It includes the whole of the lower Appalachian region, and is marked both by the extraordinary number of species and by the occurrence of numerous relics, endemic species, and monotypic genera. Migration routes from this center extend to the north and northwest, mainly along the uplands, and by far the largest part of

* Southeastern United States as a center of geographical distribution of flora and fauna. Biol. Bull. 3 : 115–131. 1902.

the flora of the wooded portion of the eastern United States, north to the transition zone, can be referred to it.

South of this region and surrounding it on three sides lies the coastal plain. Although included with the southeastern center by Adams it is distinct from it, and is similarly characterized by a large number of endemic forms. From this center species have migrated to the northward and westward, following the coastal plain to New England and the river valleys to Nebraska and Minnesota. The peculiar flora of the swamps of southern Illinois and southeastern Missouri is directly due to the influence of this center, a fact already recognized by Bush.*

In the southwest lies a large, rather vaguely defined center in Texas, which may be spoken of as the Texan center. It has served as the origin of the greater number of species of the prairie province which extends northward from it. Of larger extent and less definitely bounded than the southeastern center it has correspondingly fewer endemic species, but its importance as a distributional center is not less.

The fourth or Ozarkian center was first recognized by Coulter,† who called attention to the presence there of four endemic genera of Umbellifers, and was also mentioned by Bush.‡ It includes the Ozark region of Missouri, Arkansas and Indian Territory, and extends also into Texas. Not only Umbellifers, but other genera and species are endemic here, and although of limited extent, the center has been of great importance in influencing the flora of the adjacent states and traces of its flora are seen even in southern Illinois.

Corresponding to these distributional centers two principal geographic divisions may be recognized among the species of Vernonieae in the United States, the one southeastern, the other southwestern. Neither has any standing from a purely morphological view, since they are not distinguished by any one set of morphological characters. Practically every type of foliage, pubescence, involucre, number of flowers or ecological habit found among the species in one division is repeated in one or more species of the other. But the phytogeographical diversity of the two is evident.

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* Rep. Missouri Bot. Gard. 5 : 140. 1894.

† Geographical distribution of North American Umbelliferae. Proc. Am. Assoc. Adv. Sci. 39 : 292–298. 1891.

‡ L. c.

With the exception of *Vernonia altissima*, which extends westward well across the Mississippi river, the species of the two centers do not overlap. In this one case, *V. altissima* is in its western range confined entirely to the rich wooded alluvial bottom lands, a plant formation always recognized by phytogeographers as of southeastern origin. The southwestern species of the same region are invariably xerophytes of the uplands, or rarely hydrophytes of open swamps, associations normally characterized by southwestern species and in which *V. altissima* is never found. The ecological distinction between the two is therefore complete, for it is well known that ecological barriers of this nature may be more nearly insurmountable than hundreds of miles of distance alone.

The separation of these distributional centers dates back to the glacial period, and the two groups of Vernonieae have accordingly been separated since that time. It is also found that those species most nearly alike morphologically, such as *V. flaccidifolia* and *V. altissima*, or *V. fasciculata* and *V. Lettermanni*, are always distributed about the same center. These two statements lead inevitably to the conclusion that these groups of nearly related species are all of inter-glacial or post-glacial origin, so that groups separated on a geographical basis are at the same time separated phylogenetically as well. Considered in this light it is seen that the western plant described by Gray as *V. altissima grandiflora* can not possibly be a variety of that species, and that *V. texana* can not be grouped with *V. angustifolia* as has heretofore always been done.

Within the two divisions geographical evidence can not be given such a high rank, yet a study of distribution shows that of eleven species of *Vernonia* of the coastal plain but two are found inland, and that for but a minor part of their range; that of four Appalachian species two only extend a short distance into the coastal plain; and that the three Ozarkian species and the ten Texan species overlap in but two cases. Those are *V. Lettermanni*, endemic to the extreme southern part of the Ozarkian center, but clearly related to the Texan group Fasciculatae, and *V. interior*, which extends southward well into the Texan center. In each of these exceptions the morphological evidence is so apparent that there is in no case any doubt as to the relationship of the species concerned.

Another point that can be satisfactorily studied by the geographical method only is the relation of a species as a whole to its various

subspecies or forms. It may best be illustrated by two examples. The two forms described as *V. Baldwini* Torr. and *V. interior* Small were regarded by Mackenzie and Bush as two forms of one species; the former was reduced to a variety of the latter, and a new name, *V. interior Baldwini*, was published. The same course is followed in this paper. Nomenclatorially the name should be *V. Baldwini interior*, since *Baldwini*, the oldest name, must apply to the species according to current rules of nomenclature. However, *V. Baldwini* is not the species, but only a local eastern form of the more widely distributed *V. interior*. This is shown by the migration routes of species from the Ozarkian center. One of them extends northeast through southern Missouri into Illinois, and it is along this extension that the variety occurs. If species migrated in the other direction, from Illinois toward Arkansas, which is not the case, then there would be some reason for regarding *V. interior* as the variety. A second and similar case is that of *V. ovalifolia*, which, as its morphological structure shows, belongs to the group Altissimae of the Appalachian center. The Floridian form of the plant with different foliage is therefore a variation from the normal, although unfortunately the type specimens of Torrey and Gray belong to it. Further details of the significance of geographical distribution will be given under the appropriate genera and species.

In the treatment of the species and genera keys have been given to all the species whose validity has been admitted. Some descriptions have been inaccessible, and a few others are so fragmentary that the names must be regarded as *nomina subnuda*. Specific descriptions have been included in most cases, but omitted for the commoner well-known forms. Specimens have been cited in many cases where the species are obscure or little known. The nomenclature naturally follows the principles set forth in the Philadelphia Code of 1904.* Especial care has been taken to ascertain the specific type of each genus, since it is believed that final stability of nomenclature can only be attained by grouping the species of a genus around one definite type. In one case only is a name introduced in direct contravention of the rules cited; that of *Vernonia interior Baldwini* already mentioned. In that case it would be opposing the known facts of the relationship of the two forms if the code were followed in detail, an event certainly neither expected nor desired by its founders.

* Bull. Torrey Club 31 : 249–290. 1904.

VERNONIEAE Cass. Bull. Soc. Philom. **1815**: 173. 1815

Carduaceae; heads homogamous, hermaphrodite; scales of the involucre loosely or closely imbricated in few or several series, or rarely few and not imbricated; receptacle flat or subconvex, normally smooth or pitted, rarely hairy, bristly or chaffy; corolla white to red or blue, never yellow, regularly toothed or lobed, rarely irregularly lobed (Elephantopeae) or subligulate (*Stokesia*); anthers sagittate at base or in some genera subcaudate; style-branches slender, tapering, acute, hairy without, stigmatose within; achene terete or subterete, ten-angled or ten-costate, by reduction or interposition 3–20-costate; pappus none, or of bristles, scales, or scales and bristles, in one or more series. Herbs, shrubs, vines or small trees, with alternate, entire to serrate leaves.

Conspectus of North American Genera

1. Subtribe EUVERNONIEAE. Heads separate

Pappus a cartilaginous ring.
- Bristles none. — 1. *Struchium.*
- Bristles present within the ring. — 2. *Pacourina.*

Pappus of scales, bristles, or both scales and bristles.
- Pappus very deciduous; outer involucral scales foliaceous. — 3. *Centratherum.*
- Pappus persistent, of bristles or of bristles and scales.
  - Anthers subcaudate at base; heads in axillary clusters. — 4. *Piptocarpha.*
  - Anthers obtuse at base.
    - Bristles of the pappus in one or more series, uniform in length.
      - Leaves all basal. — 5. *Lachnorhiza.*
      - Cauline leaves present. — 6. *Leiboldia.*
    - Bristles of the pappus in two series, the outer much shorter than the inner.
      - Heads 8–88-flowered; scales of the involucre persistent. — 7. *Vernonia.*
      - Heads 1–5-flowered, in rounded panicles. — 8. *Eremosis.*
- Pappus persistent, of scales.
  - Receptacle chaffy. — 11. *Bolanosa.*
  - Receptacle not chaffy.
    - Corollas irregularly lobed, appearing subligulate. — 12. *Stokesia.*
    - Corollas tubular, regularly lobed.
      - Heads 1–8-flowered. — 9. *Oliganthes.*
      - Heads 8-flowered or more. — 10. *Piptocoma.*

2. Subtribe LYCHNOPHOREAE. Heads aggregated into secondary capitula or glomerules

Corolla 5-cleft; style deeply 2-lobed; involucral scales 8 or more.
- Pappus-bristles all alike, straight.

Bristles numerous, not enlarged at base. 13. *Orthopappus.*
Bristles 5, dilated at base. 14. *Elephantopus.*
Pappus-bristles dissimilar, two lateral ones longer and conduplicate near the apex. 15. *Pseudelephantopus.*
Corolla 3–5-toothed ; style-branches short ; involucral scales 2–5.
Involucral scales 2 ; pappus a persistent toothed crown. 16. *Rolandra.*
Involucral scales 5 ; pappus of deciduous separate scales. 17. *Spiracantha.*

1. STRUCHIUM P. Browne, in St. Hilaire, Expos. 1 : 406. 1805

Heads many-flowered, single or clustered in the axils of the leaves; involucre hemispheric, scales many, imbricated in several series, the outer shorter; receptacle subconvex; corolla purple, 3–4-lobed; achenes 3–4-angled and ribbed, glabrous or minutely glandular, truncate at the apex, surmounted by a persistent, shallowly lobed or entire cartilaginous crown. Herbaceous, erect, simple or sparingly branched, internodes short, leaves petiolate, pinnately veined.

A monotypic genus of tropical America, introduced into Africa.

STRUCHIUM SPARGANOPHORUM (L.) Kuntze, Rev. 1 : 366. 1891

Ethulia sparganophora L. Sp. Pl. ed 2. 1171. 1763.

Sparganophorus Vaillantii Crantz, Inst. 1 : 261. 1766.

Struchium herbaceum P. Browne, in St. Hilaire, Expos. 1 : 406. 1805.

Struchium americanum Poir. Encyc. 7 : 475. 1806.

Characters of the genus. Erect, 2–10 dm. high; stem puberulent or glabrate; leaves thin, elliptic to lanceolate, acuminate, serrate, glabrous or nearly so, 5–12 cm. long; petioles slender, 1–2 cm. long; heads sessile, 6–9 mm. in diameter, about 50-flowered; involucral scales acuminate, scarious on the margins; achenes oblong, quadrangular, ribbed at the angles, the crown nearly white, half the length of the achene.

Type locality: "Habitat in India."

Distribution: Cuba and southern Mexico south to Brazil, in wet places and along streams.

The name *Struchium* was not validly published until 1805, although in 1756 it was used for the plant by Patrick Browne,* without the publication of a binomial name. The same objection applies to Adanson's *Athenaea*.† The type of *Sparganophorus*‡

* Civ. & Nat. Hist. Jam. 312, *pl. 34. f. 12.*

† Fam. 2 : 121. 1763.

‡ Crantz, Inst. 1: 261. 1766.

is *Sparganophorus Ethulia* Crantz (*Ethulia conyzoides* L.), the first species cited. The use of the name is also invalidated by Adanson's *Sparganophorus*,* published three years earlier and based on a plate of Clusius representing some Anthemideous plant.

2. PACOURINA Aubl. Pl. Gui. **2**: 800. 1775

Haynea Willd. Sp. Pl. **3**: 1787. 1804.

Pacourinopsis Cass. Bull. Soc. Philom. **1817**: 151. 1817.

Heads axillary, many-flowered, sessile; involucre broadly depressed-hemispheric, its scales scarious, appressed and closely imbricated at the base, herbaceous and spreading at the apex; receptacle flat; corolla regular, deeply 5-cleft; anthers sagittate, the lobes obtuse at the base; styles long-exserted; achenes prismatic, elongated, pubescent, obscurely 10-ribbed, tipped with a minute denticulate or entire cartilaginous ring, within which are about two rows of short, deciduous, hispid bristles more or less connected at the base. Tall erect herbs with large thin dentate or runcinate thistle-like leaves and extremely large heads.

One polymorphic species in tropical America.

PACOURINA EDULIS Aubl. *l. c.*

Haynea edulis Willd. *l. c.*

Pacourinopsis integrifolia Cass. *l. c.*

Pacourinopsis dentata Cass. *l. c.*

Pacourina cirsiifolia H.B.K. Nov. Gen. **4**: 30. 1818.

Characters of the genus; leaves 15–20 cm. long, 5–8 cm. wide, deeply and irregularly serrate with spinous teeth; heads 3 cm. wide and high; achenes 1 cm. long.

Type locality: French Guiana.

Distribution: Hispaniola, *Wright*, *Parry & Brummel;* Nicaragua, *Levy 103;* and through tropical South America. Its occurrence in North America in but two widely separated stations would indicate that it is an introduced species.

Aublet's original had leaves merely remotely denticulate. The form with deeply serrate leaves, like the two North American plants, was separated by Cassini as distinct, under the name *Pacourinopsis dentata* (*Pacourina cirsiifolia* H.B.K.).

3. CENTRATHERUM Cass. Dict. Sci. Nat. **7**: 383. 1817

Amphirephis H.B.K. Nov. Gen. **4**: 32. 1818.

Spixia Schrank, Pl. Rar. Hort. Monac. *pl. 80.* 1821.

* *L. c.*

Involucre hemispheric or broadly campanulate; scales in several series, the outer foliaceous and spreading, the intermediate and inner erect or appressed, membranous or scarious; heads many-flowered; receptacle subconvex, corollas deeply 5-cleft, purplish or blue; anthers sagittate, obtuse at the base; achenes ribbed; pappus-bristles few to many, short, caducous. Herbaceous, diffusely branching, with petioled serrate leaves; heads pedunclëd, usually terminating the branches.

Type, *C. punctatum* Cass.

Twelve species, according to Hoffmann, most of which are Old World forms, and probably not congeneric with the four or five New World species. In America *Centratherum* is characteristic of tropical South America, and none of the species extends much beyond it.

Inner scales obtuse or rounded at the apex, ciliate-denticulate with glandular hairs and more or less glandular on the back. 1. *C. intermedium.*

Inner scales rounded to aristate, the margin minutely glandular or not at all, arachnoid or tomentose on the back.

Inner scales obtuse or acute, mucronate or aristate, the intermediate with awns 2 mm. or more in length. 2. *C. punctatum.*

Inner scales obtuse or rounded, the intermediate with awns less than 1 mm. long or none. 3. *C. muticum.*

1. Centratherum intermedium (Link) Lessing, Linnaea 4: 320. 1829

Amphirephis intermedia Link, Abb. K. Bot. Gart. Berlin. 65. 1820.

Spixia violacea Schrank, Pl. Rar. Hort. Monac. *pl. 80.* 1821.

Erect, with ascending branches, 3–5 dm. high; stem stout, somewhat angled, puberulent; leaf-blades thin, ovate to oblong-ovate, obtuse or subacute, deeply crenate-serrate, glabrous above, puberulent beneath, abruptly arcuately narrowed at base into a long margined petiole; length of blade and petiole 3–4 cm., width 1–1.8 cm.; heads on terminal peduncles; outer scales 5–9, 1.5–2.5 cm. long, foliaceous, in shape and texture resembling the foliage leaves; intermediate scales scarious, ovate to ovate-lanceolate, acuminate into a prominent awn, glabrous except some arachnoid tomentum near the base of the awn; inner scales rounded to subacute at the tip, ciliate with short glandular hairs and somewhat glandular on the back; achenes obovoid, prominently ribbed.

Type locality: Brazil.

Distribution: Martinique, *Duss 1734*, and Guadeloupe, *Duss 2526*, to Brazil.

2. CENTRATHERUM PUNCTATUM Cass. Dict. Sci. Nat. 7: 384. 1817

Amphirephis aristata H.B.K. Nov. Gen. 4: 32. 1818.

No North American specimens of this species have been seen, and it is admitted to the North American flora only on the report of Seemann,* who listed it from the Isthmus of Panama. The following characterization is taken from Colombian plants, *Holton 301* and *André 1727*, in the Gray Herbarium.

Erect, 4 dm. high, stem puberulent; leaves firm, lanceolate or oblong-lanceolate, 2–3 cm. long, 4–7 mm. wide, acute, serrulate or entire, attenuate at base into a margined petiole, glabrous above, puberulent beneath; outer scales of the involucre similar to the leaves, but little exceeding the head; intermediate scales pubescent near the tip, abruptly narrowed into an awn 2–4 mm. long; inner scales obtuse or acute, spinulose-denticulate, mucronate or short-awned.

Type locality: Isthmus of Panama.

Distribution: Panama and Colombia.

3. CENTRATHERUM MUTICUM (H.B.K.) Lessing, Linnaea 4: 320. 1829

Amphirephis mutica H.B.K. Nov. Gen. 4: 32. 1818.

Stem pubescent; leaves rather thick, pubescent on both sides, sharply serrate, gradually attenuate at base, 1.5–2 cm. long, 5–7 mm. wide; outer involucral scales equaling or a little longer than the heads, the intermediate acute or with short awns, the inner obtuse to rounded, not glandular-ciliate, arachnoid or sparsely glandular.

Type locality: "Nova Andalusia."

Distribution: Mexico (*fide* Kew Index), Colombia, *Otto*.

4. PIPTOCARPHA R. Br. Dict. Sci. Nat. 41: 109. 1826

Carphobolus Schott; Sprengel, Syst. Veg. Cur. Post. 409. 1827.
Monanthemum Griseb. Fl. Brit. W. Ind. 354. 1864.

Heads few- (3–20-) flowered, aggregated in axillary or terminal corymbs, umbels or panicles, or sessile in axillary clusters; involucre ovoid or campanulate; scales imbricated in several series, the outer smaller, the inner frequently falling with the achenes; corolla 5-cleft; anthers sharply subcaudate at base; achenes truncate, ribbed; pappus-bristles in two series, the inner long, equal, the outer much shorter, unequal, inconspicuous or apparently in some

* Bot. Voy. Herald 140.

species none. Shrubs, frequently climbing: leaves large, usually entire, coriaceous, and tomentose with stellate hairs or scaly beneath.

Type, *P. brasiliana* Cass. Dict. Sci. Nat. **41**: 109. 1826.

Species about 28, in the American tropics from Mexico and Porto Rico to Brazil.

In the original description of the genus * Brown did not cite or describe a species. The next author to use the name was Cassini, who without seeing any specimens gave the specific name *brasiliensis* to the plant described by Brown, using for that Brown's own characters. *P. brasiliana* is not mentioned by Baker in his treatment of the genus in the Flora Brasiliensis, but it is evidently *P. umbellulata* Baker (=*P. Brownii* DC.).

Heads mostly 6-flowered, corymbose in the axils. 1. *P. chontalensis.*
Heads mostly 4-flowered, in terminal corymbiform clusters.
2. *P. tetrantha.*

1. Piptocarpha chontalensis Baker, Fl. Brasil. 6^2: 132. 1873

Piptocarpha costaricensis Klatt, Prim. Fl. Costar. 1^2: 120. 1893.

Shrubby; branches faintly striate or terete, slightly flexuous, thinly cinereous-tomentose; leaves coriaceous, oblong-ovate to ovate, 10–18 cm. long, 4.5–10 cm. wide, acute or abruptly short-acuminate, entire or remotely denticulate, obliquely and unequally rounded at the base, dark-green, glabrous and shining above, dull-green and closely cinereous beneath, the petioles 1–1.5 cm. long; bracteal leaves similar but smaller; heads numerous, crowded in axillary corymbiform clusters, 6-flowered, sessile in clusters of 2–3 terminating tomentose peduncles; involucre ovoid, 3–4 mm. high; scales closely imbricated, appressed, ovate, obtuse or rounded, the outer tomentose, the inner glabrous except the tomentose tip, deciduous; achenes sharply 5-ribbed with 5 secondary less prominent ribs, 3 mm. long, glabrous or with a few scattered hairs; pappus white, 6-7 mm. long, bristles of the outer series short, barely distinguishable from the inner.

Type locality: "Nicaragua in ditione Chontales."

Distribution: Guatemala, *Türckheim 7892*, *Watson 326*, Costa Rica, *Pittier 4927*, *12153*, *3704*, *Donnell Smith 6613*, *4846*, *Tonduz 13276*, and Nicaragua.

A well-marked species, rather variable in leaves and pubescence. Klatt's species is founded on a Costa Rican form with leaves more than half as wide as long and finely gray-tomentose beneath. The

* Trans. Linn. Soc. 12: 121. 1816.

Guatemalan plants tend to show relatively narrower leaves, less broadly rounded below, and with a softer grayish-brown tomentum. Baker's type was probably like the latter, since in his description he speaks of oblong leaves, pale brown-pubescent beneath. However, the two cannot be specifically separated.

2. PIPTOCARPHA TETRANTHA Urban, Symb. Ant. 1: 457. 1900

Shrubby; branches striate, closely and finely cinereous-pubescent; leaves broadly elliptic to elliptic-oblong, 3.5–10 cm. long, 2–4 cm. wide, obtuse or rounded, entire, rounded at base, coriaceous, dark-green, glabrous and shining above, finely cinereous-tomentose beneath, prominently reticulately veined, the petioles 1–1.5 cm. long, dilated; heads 4-flowered, sessile, aggregated in clusters of 2–4 in a dense small terminal panicle; involucre ovoid, 6 mm. long; scales closely imbricated in few series, all appressed, the outer short, ovate, tomentose, the inner oblong, glabrous below, densely tomentose at the tip; achenes 3–4 mm. long, glabrous, 10-ribbed; pappus 4–6 mm. long, tawny-white, the outer series short.

Type locality and distribution: Porto Rico.

The two sheets examined present striking dissimilarity in the foliage. In one, *Sintenis 6084*, the leaves are of an oblong type, 8–10 cm. long and about two and a half times as long as wide; in the other, *Sintenis 4017*, they are broadly ovate-elliptic, the largest only 5 cm. long, and over half as wide. There is apparently no other difference between the two. This species has been referred to in literature as *Piptocarpha triflora* Baker, a Brazilian species which it closely resembles.

Excluded Species

Piptocarpha sexangularis Klatt* has opposite leaves, with connately dilated petioles, multistriate scales and uniseriate pappus. It belongs probably to the Eupatorieae, certainly not to the Vernonieae.

5. LACHNORHIZA Rich. in Sagra, Hist. Fis. Pol. Nat. Cuba 11: 34. 1850

Heads many-flowered; involucral scales imbricated in few series; receptacle flat; corolla regular, 5-cleft; anthers sagittate, the lobes acute at the base; achenes prismatic, obscurely ribbed; pappus capillary, of numerous bristles in one series. Scapose perennial

* Bull. Soc. Bot. Belg. 35: 278. 1896.

herbs bearing 1–4 heads in a corymbiform cluster; leaves arising from a densely woolly crown.

Probably a monotypic Cuban genus, although Hoffmann refers here some little-known scapose African forms.

LACHNORHIZA PILOSELLOIDES Rich. *l. c.*

Lachnorrhiza asteroides Griseb. Cat. Pl. Cuba 152. 1866.

Characters of the genus; leaves spatulate or oblong-spatulate, acute or obtuse, entire, gradually narrowed below into a margined pubescent petiole, glabrous above, sparingly pubescent beneath, 5–14 cm. long including the petiole, 1–2 cm. wide, the lateral veins obscure; scape erect, puberulent, 1.5–3 dm. high, peduncles subtended by subulate bracts; involucre campanulate, 8 mm. high; scales all erect, loosely imbricated in few series, pubescent and glandular, the outer triangular-lanceolate, the inner oblong to oblong-lanceolate, acute; achenes 2.5 mm. long, glabrous, with a prominent basal callus; pappus tawny, 6 mm. long.

Type locality: "In insula Pinorum."

Distribution: Cuba and the Isle of Pines.

The status of the genus has long been doubtful. Its author recognized its relationship to *Vernonia* and included it in the same tribe. His principal reason for distinguishing it generically was the acuteness of the bases of the anthers. Grisebach, for the same reason, regarded it as related to the Inuleae, to which tribe he transferred it. Bentham and Hooker placed it among the Vernonieae again, separating it from *Vernonia* principally because of its scapose habit. This feature, however, is shared by *Vernonia acaulis*, and the involucral characters of the two are much the same. Hoffman reduced the genus to a section of *Vernonia*, although quoting the original name for the species. All of these later authors have overlooked the uniseriate pappus, a character mentioned in Richard's original description. Since in this paper the presence of two unequal series of pappus-bristles has been taken as a criterion of *Vernonia*, *Lachnorhiza* has, for this reason as well as its other structural peculiarities, been kept as a distinct genus.

6. LEIBOLDIA Sch.-Bip. Linnaea 19: 742. 1847

Heads very large, many-flowered, crowded in dense corymbiform clusters; involucre broadly hemispheric or campanulate, the scales very many, imbricated in numerous series, acuminate to rounded; receptacle flat or subconvex; corolla regular, the tube slender, the limb deeply 5-cleft; anthers sagittate, obtuse at the base; achenes

glabrous, prominently angled, surmounted by a narrow or broad callus-ring; pappus in 2–3 series, capillary, its bristles all equal or nearly so, at least not in two unequal series. Shrubs with pubescent or tomentose stems and large rugose obovate leaves, usually scabrous above and tomentose beneath.

Type, *Vernonia Leiboldiana* Sch.-Bip.

Four species, natives of southern Mexico. Distinguished from *Vernonia* primarily by the structure of the pappus, the genus has also a very different habit, due to the huge crowded heads and large broadly obovate leaves. The callus-ring surmounting the achenes becomes obscure at maturity.

Leaves thin; heads peduncled; scales glabrous or nearly so, acute to obtuse, the principal ones about 4 mm. wide.
- Leaves green beneath, merely strigose. 1. *L. Salvinae.*
- Leaves cano-tomentose beneath. 2. *L. mexicana.*

Leaves thick; heads nearly sessile; scales pubescent or tomentose, regularly tapering to a long point, the principal ones 2 mm. wide.
- Scales prominently carinately nerved; achenes tipped with a narrow callus ring. 3. *L. Leiboldiana.*
- Scales not prominently nerved; achenes usually tipped with a broad callus ring. 4. *L. serrata.*

1. Leiboldia Salvinae (Hemsley) nom. nov.

Vernonia Salvinae Hemsley, Biol. Cent. Am. Bot. **2**: 73. 1881.

Herbaceous or shrubby; younger branches ferruginous-tomentose, becoming glabrate with age; cauline leaves membranous, oblong-oblanceolate to narrowly obovate, 15–25 cm. long, 4–7 cm. wide, short-acuminate, narrowed below into short petioles, rather remotely serrate with low callous teeth, pinnately veined, puberulent above, especially along the midvein, strigose-hirsute beneath; heads 1–5, on peduncles 3–7 cm. long: involucre broadly campanulate, 15 mm. high; scales thin, purple, somewhat spreading at the tip, ovate to oblong, rounded to subacute at the apex, or the inner most acuminate, puberulent and glandular, especially near the tips; achenes sharply 4–5-angled, with a prominent callus-ring; pappus tawny, about 7 mm. long.

Type locality: Guatemala.

Distribution: Chiapas, Mexico, *Nelson 3747*, to Guatemala and Costa Rica, *Werckle 11604*.

L. Salvinae is a little-known species poorly represented in herbaria. Hemsley made no mention of the structure of the pappus, although he described the tetragonal achenes. Its supposed relationship to *Vernonia Alamani* DC. is merely one of habit, the two differing completely in the structure of pappus and achenes.

2. Leiboldia mexicana (Lessing) nom. nov.

Vernonia mexicana Lessing, Linnaea **6**: 680. 1831.

? Vernonia Salvinae canescens Coulter, Bot. Gaz. **16**: 95. 1891.

Shrub with ferruginous-tomentose branches; leaves thin, obovate, abruptly short-acuminate, mucronulately serrulate, regularly tapering to the base, nearly smooth above, thinly cano-tomentose beneath, pinnately veined, 20 cm. long, 15 cm. wide, *fide* Lessing; petioles tomentose, *fide* Lessing 3.5–5 cm. long; heads pedunculate; involucre broadly hemispheric, 2 cm. high, 3 cm. broad; scales glabrous, thin, loosely imbricated, the outer ovate, broadly rounded and somewhat spreading at the tip, the inner acute or subacute, exposed portion of the principal scales 4–5 mm. wide; mature achenes and pappus not seen.

Type locality: Cuesta grande de Chiconquiaco.

Distribution: Southern Mexico.

The single specimen examined is in the Klatt collection in the Gray Herbarium, and consists of a detached leaf 11 cm. long by 5 cm. wide, and a flowering branch bearing a few peduncled heads. There is no indication of the date or collector, except that it apparently antedates DeCandolle's Prodromus. If so it may possibly be a fragment of Lessing's original. Specimens of Coulter's variety have not been seen, and it is referred here merely because of its tomentose leaves.

3. Leiboldia Leiboldiana (Sch.-Bip.) nom. nov.

Vernonia Leiboldiana Sch.-Bip. Linnaea **19**: 742. 1847.

Leiboldia ovata Sch.-Bip. *l. c.*

Shrub 1–2 m. high, sparingly branched; stems stout, strongly angled, densely cinereous-tomentose; leaves thick, subcoriaceous, obovate, 14–24 cm. long, 7–12 cm. wide, acute or abruptly short-acuminate, sharply mucronately serrate, regularly tapering to a rounded, truncate, or subcordate base, dull-green and scabrous above, densely and softly cinereous beneath; lateral veins prominent; veinlets reticulated, sessile or short-petioled; uppermost leaves much smaller; heads numerous, sessile or nearly so, densely aggregated; involucre hemispheric or broadly campanulate, 16 mm. high; scales erect, tomentose, especially near the base, the outer ovate, the inner oblong-linear, all regularly tapering into a long acuminate tip; achenes 2.5 mm. long, sharply 4–5-angled, with or without secondary intermediate ribs, surmounted by a narrow callus-ring; pappus white, fragile, 1 cm. long.

Type locality and distribution: Mexico.

Here are referred the following exsiccatae: *Botteri 603*, *Prin-*

gle 6085, and *Conzatti & González 1111*, as well as several other older specimens. The carinate midnerve of the involucral scales is perhaps the most constant character separating it from the next. Their tips are pubescent rather than tomentose and tend to become glabrous with age.

4. **Leiboldia serrata** (Don) nom. nov.

Diazeuxis serrata Don, Trans. Linn. Soc. **16**: 254. 1830.
Vernonia arctioides Lessing, Linnaea **6**: 400. 1831.
Leiboldia arctioides Sch.-Bip. Linnaea **19**: 743. 1847.

In foliage and general habit resembling *L. Leiboldiana*, but distinguished by the involucral scales, which are not carinately nerved, but rather striate, and more tomentose at the tip, and the achenes, which are tipped with a yellowish callus-ring about 0.5 mm. wide.

Type locality and distribution: Mexico. Orizaba, *Müller 329, 955, 1440* (one specimen); Chiconquiaco, *Schiede 1238*. The latter is one of the originals of Lessing's *Vernonia arctioides*.

7. VERNONIA Schreb. Gen. Pl. **2**: 541. 1791

Suprago Gaertn. Fruct. **2**: 402. 1791.
Baccharoides Moench, Meth. 578. 1794.
Ascaricida Cass. Dict. Sci. Nat. **3**: Suppl. 38. 1816.
Lepidaploa Cass. Bull. Soc. Philom. **1817**: 66. 1817; and Dict. Sci. Nat. **26**: 16. 1823.
?*Achyrocoma* Cass. Dict. Sci. Nat. **26**: 21. 1823.

Heads homogamous, 8–many-flowered; involucre narrowly campanulate to hemispheric, its scales loosely or closely imbricated in few or many series, the outer successively shorter; receptacle flat or subconvex; corollas regular, the limb 5-cleft; anthers sagittate at the base, not prolonged into caudate appendages; achenes ribbed or ribless, truncate; pappus in two series, the outer short, of scales or bristles, the inner long, capillary.

Herbs or shrubs, nearly all the species perennial, with usually leafy stems, branching at least at the inflorescence; heads in scorpioid cymes, paniculate cymes, solitary in the axils, or terminal. About 600 species, of temperate and tropical America, Asia and Africa.

Nomenclatorially the genus is grouped about the type species *V. noveboracensis*, that being the first of Dillenius' species cited by

Schreber to receive a binomial name. A large number of generic synonyms belong to the genus as a whole, but only five of these apply to North American species. *Suprago* Gaertn. was published in the same year as *Vernonia*, and there is apparently no evidence which of them is the older. It is typified by *Suprago glauca* (*V. glauca* Willd.). *Baccharoides* and *Ascaricida* both refer to *V. anthelmintica*, *Lepidaploa* is based on *V. scorpioides*, and since the publication of the Prodromus has been used as a sectional name. The identity of Cassini's *Achyrocoma tomentosa* (*V. Achyrocoma* Lessing) is uncertain and the name is treated here as a *nomen nudum*.

The genus *Vernonia*, even after the segregation of the forms here placed in *Lachnorhiza*, *Leiboldia* and *Eremosis*, is still a huge aggregation presenting striking variation in the structure of the inflorescence and involucre. Comparing some of the extreme forms, such as *V. bahamensis*, *V. arborescens* and *V. crinita*, the diversity seems almost sufficient to warrant their separation into distinct genera. Eight genera could be constructed from the North American species if these extremes were taken as types. But examination of all the species shows that these diverse forms are all derived one from the other and in most cases it is easy to trace the connecting links. *V. bahamensis* and its relatives, here placed in the subsection *Scorpioideae reductae*, may be easily connected through *V. albicaulis* to normal scorpioid forms; *V. buxifolia* and the allied species, constituting the *Scorpioideae aggregatae*, show a similar relationship through *V. acuminata*. The close relationship of the *Scorpioideae foliatae* and *Scorpioideae aphyllae* is obvious. By repeated branching of the cymes in the latter arise such forms as *V. canescens*, in which the inflorescence assumes a pseudo-paniculate appearance. By the shortening of the individual cymes an inflorescence like that of *V. scabra* is produced; from that to the true *Paniculatae* is but a short step. There is, accordingly, from one extreme to the other an almost unbroken series of intermediate forms making the segregation of genera impossible. The two Old World species, *V. anthelmintica* and *V. cinerea*, belong to different sections of the genus and there are stronger reasons for removing them, an action which has however been deemed inadvisable.

Within this vast assemblage certain groups of species stand in relief from their marked resemblance one to the other. As a con-

venient example may be mentioned *V. arborescens* and its relatives, all with a similar structure of inflorescence, with hirsute achenes, normally ovate leaves, a definite type of pubescence, and above all a definite and typical habit. These species-groups are in general characterized by a community of morphological features rather than by any definite and peculiar structures, and as a rule the component species occupy the same or adjacent territory. There is good evidence that the groups in the United States include naturally related species of common ancestry; the presumption is that the groups in the tropics have the same value. But since all the species of *Vernonia* may be considered to have also a common ancestry, the delimitation of large or small species-groups becomes merely a personal matter.

The seven subsections of *Lepidaploa* by no means represent groups of equal value. The *Scorpioideae reductae* and *Scorpioideae aggregatae* are certainly derived directly from the *Scorpioideae foliatae*, and are therefore subsidiary to it and not parallel with it. Among the *Paniculatae* the *dichotomae* and *verae* are undoubtedly phylogenetically distinct, the latter being closely related to the *Scorpioideae aphyllae* through a Mexican ancestry, while the former is endemic to Cuba and doubtless derived from forms similar to *V. havanensis*.

Geographically the North American species may be traced back to an ultimate origin in South America. This is shown by the increase towards the south in number of species and in variety of structure and also by the fact that forms intermediate between species-groups invariably occur to the southward of them. Thus in the group *Longifoliae*, *V. longifolia* is most closely related to the more typical scorpioid forms and is distributed through the Windward Islands. Northward, in Porto Rico and Hispaniola is the related *V. albicaulis*, while derived from or closely related to that species is the subsection *Scorpioideae reductae* of Cuba and the Bahamas. The migration route through the Windward Islands into the Greater Antilles has been followed almost exclusively by the *Scorpioideae foliatae*. The western route through Central America has been followed mostly by *Scorpioideae aphyllae*, and, further to the north by *Paniculatae*. Some of the more primitive forms of the latter, such as the *Texanae*, reach the southwestern United States. More specialized members of the same subsection have occupied the entire southeastern portion of the United States,

and one species even occurs in the Bahamas. The two extremes of the different routes have therefore at last met.

The species of the genus usually show definite characters, allowing their exact separation. Intermediate forms are nevertheless abundant, and have frequently been referred to hybridization. There is, however, no evidence whether they are hybrids or merely chance variations. In general the change from the normal is in but one or two characters, such as the shape, pubescence or serration of the leaves or the shape of the involucral scales, and it is seldom difficult to determine the specific identity of the variants. Within the species there is often great variability, and extreme forms have frequently been regarded as distinct. Thus there is an unbroken series of forms between typical *V. gigantea* and *V. oligantha*, or between *V. interior* and *V. Baldwini*, and in each case the two must be reduced to one single species.

The number of flowers in each head has frequently been used as a basis for separating species and has been found quite constant within certain limits. The number follows closely the phyllotactic series 8, 13, 21, 34 and 55. The series may be constructed by adding each two numbers to form the next higher. An intermediate series may be constructed by omitting one number and adding each alternate two. This series includes the numbers 11, 18, 29 and 47. In practice the ripe achenes are counted, pulling them from the involucre by forceps, and the number, if none is abortive, is invariably found to correspond closely with some of the series. The lowest numbers, 8, 11, and 13, are usually followed exactly; the upper ones may vary one or two in either direction. In the descriptions the variations have seldom been taken into account, and only the typical number is indicated, thus 8 in *V. Lettermanni*, 13 in *V. concinna* and 21 in *V. fasciculata*.

Key to the North American Species

Some or all of the involucral scales constricted below a membranous green leaflike appendage. — Section Baccharoides.

Involucral scales membranous or scarious, but without a conspicuous green terminal appendage.

- Achenes terete, without ribs, or faintly ribbed. — Section Tephrodes.
- Achenes ribbed or furrowed. — Section Lepidaploa.

Section Baccharoides

One species in North America. — 1. *V. anthelmintica*.

Section TEPHRODES

One species in North America. 2. *V. cinerea.*

Section LEPIDAPLOA

Some or all of the heads sessile, in scorpioid cymes of 1–many heads.

Cymes elongated, simple or branching, bearing usually numerous heads, each subtended by a bracteal leaf. I. *Scorpioideae foliatae.*

Cymes reduced to 1–4 heads, which therefore frequently appear sessile in the axils of the upper leaves. II. *Scorpioideae reductae.*

Cymes much shortened, the heads appearing aggregated in capitate or subcapitate clusters. III. *Scorpioideae aggregatae.*

Cymes elongated, simple or freely branched, bearing usually numerous heads, which are not subtended by bracteal leaves. IV. *Scorpioideae aphyllae.*

Heads mainly peduncled, in corymbiform or paniculate clusters, not scorpioid or racemose.

Branches of the inflorescence repeatedly dichotomously branched, the internodes successively and uniformly decreased in length, forming regular rounded panicles. V. *Paniculatae dichotomae.*

Branches of the panicle aggregated or separated by short internodes, peduncles all about the same length, forming subumbellate rounded panicles. VI. *Paniculatae umbelliformes.*

Branches of the panicle irregular in length, the uppermost heads sessile or short-peduncled, the lower on more elongated peduncles, forming crowded or lax, irregular or depressed panicles. VII. *Paniculatae verae.*

I. SCORPIOIDEAE FOLIATAE

* Involucre 8–10 mm. high, its scales subulate, straight, erect or somewhat spreading, not appressed, or only at the base.

† Leaves acute or acuminate, hirsute to glabrate. ARGYROPAPPAE.

Leaves of an oblong type, broadest above the middle, attenuate at base.

Leaves 8–12 cm. long, softly and densely hirsute beneath. 3. *V. argyropappa.*

Leaves 6 cm. long or less.

Leaves scabrellate above, sparsely pilose or glabrate. 4. *V. acilepis.*

Leaves pilose on both sides. 5. *V. remotiflora.*

Leaves of an ovate type, broadest below the middle, obtuse at base. 6. *V. hirsutivena.*

†† Leaves obtuse, bullate above, densely tomentose beneath. PINETICOLAE. 7. *V. pineticola.*

** Involucre 4–5 or rarely 7 mm. high, its scales not subulate, appressed or barely spreading, irregularly imbricated in a few series.

† Cymes elongated, bearing numerous heads.

‡ Inner scales acute or acuminate.

a. Heads 1–3 cm. distant, at least at maturity; leaves not excessively hirsute with long hairs beneath.

1. Leaves of an ovate or oblong type, exceeding 1 cm. in width. ARBORESCENTES.

Leaves whitened or sericeous beneath.
  Leaves hirsute beneath, with silvery or sericeous hairs.
    Pappus brown. 8. *V. phyllostachya.*
    Pappus white. 9. *V. venusta.*
  Leaves tomentose beneath.
    Leaves flat. 10. *V. sublanata.*
    Leaves deeply rugose or bullate. 11. *V. gnaphaliifolia.*
Leaves not whitened or sericeous beneath.
  Outer scales subulate-tipped, with a prominent carinate midnerve.
    Leaves narrowed at base, pubescent beneath.
      12. *V. icosantha.*
    Leaves obtuse or rounded at base, strigose beneath.
      13. *V. ventosa.*
  Outer scales lanceolate, acuminate, without a carinate nerve.
    Leaves acute or acuminate.
      Leaves 4 cm. long or more.
        Pappus tawny. 14. *V. borinquensis.*
        Pappus white. 15. *V. arborescens.*
      Leaves 2 cm. long or less. 16. *V. crassinervia.*
    Leaves obtuse, elliptic. 17. *V. membranacea.*

2. Leaves of a linear or linear-lanceolate type, less than 1 cm. wide. ARARIPENSES.

Leaves lanceolate, 3–5 mm. wide. 18. *V. araripensis.*
Leaves linear, 2 mm. wide. 19. *V. stenophylla.*

b. Heads densely crowded; leaves deeply rugose, densely hirsute with long hairs beneath. PERMOLLES.

Involucral scales pubescent below, glabrous at the top.
  20. *V. permollis.*
Involucral scales pubescent throughout. 21. *V. intonsa.*

‡‡ Inner scales obtuse or rounded. DIVARICATAE.

Leaves attenuate at the base.
  Pappus rufescent; heads 11–13-flowered. 29. *V. divaricata.*
  Pappus white; heads 18-flowered. 30. *V. albicoma.*
Leaves rounded or obtuse at base. 31. *V. expansa.*

†† Cymes shortened, bearing 1–7 heads subtended by bracts approximating the foliage leaves in size and shape. LONGIFOLIAE.

Leaves lanceolate, acuminate. 32. *V. longifolia.*
Leaves oblong or oval, acute to emarginate.
  Leaves not more than twice as long as wide. 33. *V. albicaulis.*
  Leaves three times as long as wide. 34. *V. Sintenisii.*

*** Involucre 7–10 mm. high, its scales all appressed, closely and regularly imbricated in numerous series.

† West Indian species. FRUTICOSAE.

Leaves ovate or broadly oblong.

Involucre campanulate; leaves coriaceous, revolute.

22. *V. fruticosa.*
23. *V. leptoclada.*

Involucre cylindric; leaves flat. 24. *V. Sagraeana.*

Leaves narrowly oblong to oblong-linear.

Principal scales obtuse to subacute and mucronate.

Leaves scabrellate above, obtuse or rounded at the base. 25. *V. inaequiserrata.*

Leaves very scabrous above, narrowed from above the middle to a truncate base. 26. *V. Sprengeliana.*

Principal scales sharply acute or acuminate.

Leaves thin, pilose beneath; scales densely tomentose. 27. *V. viminalis.*

Leaves thick, nearly glabrous beneath; scales arachnoid-ciliate. 28. *V. Valenzuelana.*

†† Mexican species. SCHIEDEANAE.

Inner scales obtuse or rounded at the apex.

Inner scales constricted below a dilated tip 2–3 mm. wide. 35. *V. Schiedeana.*

Inner scales narrowed to a tip 1 mm. wide. 36. *V. Seemanniana.*

Inner scales sharply acuminate. 37. *V. vernicosa.*

II. SCORPIOIDEAE REDUCTAE

Leaves 5–9 cm. long, lepidote on both sides. 38. *V. lepidota.*

Leaves 3.5 cm. long or less.

Leaves broadest at or near the middle, not conspicuously attenuate at base.

Leaf-blades 5 mm. long. 39. *V. complicata.*

Leaf-blades 1–2 cm. long. 40. *V. arctata.*

Leaves broadest much above the middle, long-attenuate at base.

Leaves broadly obcordate. 41. *V. obcordata.*

Leaves spatulate. 42. *V. bahamensis.*

III. SCORPIOIDEAE AGGREGATAE

Leaves glabrous.

Scales in about 10 series; involucre 8 mm. high. 43. *V. buxifolia.*

Scales in about 6 series; involucre 5 mm. high. 44. *V. montana.*

Leaves pubescent at least beneath.

Leaves glabrous above. 45. *V. yunquensis.*

Leaves softly pubescent on both sides. 46. *V. Thomae.*

IV. SCORPIOIDEAE APHYLLAE

* West Indian species. HAVANENSES.

Lower heads with peduncles equaling or longer than the involucre; leaves remotely toothed. 47. *V. havanensis.*

Lower heads sessile; leaves sharply serrate. 48. *V. pallescens.*

** Mexican and Central American species.

Cymes straight or curved, little branched or not at all. SCORPIOIDES.

Cymes straight; leaves gradually narrowed to an obtuse base.

49. *V. brachiata.*

Cymes curved; leaves abruptly narrowed at the base.

50. *V. scorpioides.*

Cymes flexuous, freely branched and approaching a panicle in appearance. DEPPEANAE.

Heads 11-flowered. 51. *V. Aschenborniana.*

Heads 18–21-flowered.

Leaves tomentose or floccose beneath. 52. *V. Deppeana.*

Leaves pubescent or strigose beneath.

Pappus tawny. 53. *V. patens.*

Pappus white. 54. *V. canescens.*

V. PANICULATAE DICHOTOMAE

One species. 55. *V. menthaefolia.*

VI. PANICULATAE UMBELLIFORMES

Involucre 6 mm. high or more.

Heads 18–21-flowered.

Scales all subulate. 56. *V. corymbiformis.*

Only the outer scales, or none, subulate.

Inner scales lax, somewhat spreading at tip; leaves 3–5 times as long as broad. 57. *V. Karwinskiana.*

Inner scales erect, not spreading; leaves 2–2.5 times as long as broad. 58. *V. jaliscana.*

Heads 8–11-flowered.

Leaves nearly glabrous above, 1 cm. wide or less.

59. *V. umbellifera.*

Leaves very scabrous above, 1.5 cm. wide or more.

60. *V. serratuloides.*

Involucre 4–5 mm. high; heads 8–11-flowered.

Leaves floccose-tomentose beneath. 61. *V. oaxacana.*

Leaves scabrously pubescent on the veins beneath.

62. *V. capreaefolia.*

Leaves pubescent or puberulent beneath.

Inner scales sharply acute or acuminate. 63. *V. liatroides.*

Inner scales subacute or obtuse. 64. *V. Sinclairi.*

VII. PANICULATAE VERAE

* Heads very large, 1.5–2 cm. broad.

Scales oblong with parallel sides, cuspidate, the outer reflexed; leaves ovate to lanceolate. ALAMANIANAE.

Leaves attenuate at base. 65. *V. Alamani.*

Leaves rounded or obtuse at base. 66. *V. dictyophlebia.*

Scales acuminate or filiform at the tip; leaves linear to lanceolate. CRINITAE.

Leaves 3 mm. wide, revolute, lanate beneath. 71. *V. Bolleana.*
Leaves 5–20 mm. wide, flat, glabrous or nearly so.
72. *V. crinita.*

** Heads small or medium, 0.4–1.2 cm. broad, few- to many-flowered.

† Scales rounded to short-acuminate at the apex.

‡ Leaves of a linear type.

Leaves scabrous above.
Some or all of the leaves revolute and narrowly linear.
95. *V. angustifolia.*
Leaves not revolute, linear-lanceolate to narrowly oblong.
Scales arachnoid-ciliate. 96. *V. dissimilis.*
Scales glabrous or nearly so. 67. *V. texana.*
Leaves glabrous or nearly so above.
Scales strongly pubescent or tomentose on the back. LINDHEIMERIANAE.
Leaves revolute, densely white-woolly beneath.
73. *V. Lindheimeri.*
Leaves flat, not white-woolly beneath.
Involucre campanulate ; scales sparsely ciliate.
74. *V. guadalupensis.*
Involucre hemispheric ; scales densely arachnoid-ciliate.
75. *V. Reverchonii.*
Scales glabrous or ciliate.
Heads 8–13-flowered.
Leaves narrowly linear, 1–2 mm. wide. 78. *V. Lettermanni.*
Leaves 5 mm. wide or more.
Involucre 6–7 mm. high. 97. *V. concinna.*
Involucre 3–4 mm. high. 87. *V. gigantea.*
Heads 18–29-flowered.
Involucre very loosely and irregularly imbricated, 5 mm. high.
Leaves mostly basal, broadest above the middle.
98. *V. Blodgettii.*
Leaves scattered, broadest at or below the middle.
99. *V. insularis.*
Involucre closely and regularly imbricated.
Leaves entire ; scales acuminate. 77. *V. marginata.*
Leaves serrate or dentate ; scales obtuse or acute.
Involucre 8 mm. broad. 76. *V. tenuifolia.*
Involucre 5 mm. broad. 80. *V. fasciculata.*

‡‡ Leaves lanceolate to ovate.

Leaves glabrous, thinly pubescent or scabrous beneath.
Heads 8–13-flowered. 87. *V. gigantea.*
Heads 18–29-flowered.
Pappus purple.
Involucre 4–5 mm. high. 86. *V. altissima.*
Involucre 6–8 mm. high.

Leaves 4–7 cm. long, merely acute. 79. *V. corymbosa.*
Leaves 8–15 cm. long, acuminate. 80. *V. fasciculata.*
Pappus tawny or yellowish.
Involucre 3–4 mm. high ; scales rounded or subacute. 85. *V. flaccidifolia.*
Involucre 5–6 mm. high; scales short-acuminate or sharply acute.
Leaves 2–5 cm. wide ; southeastern United States. 84. *V. ovalifolia.*
Leaves 1–2.5 cm. wide; Mexican. 68. *V. Ervendbergii.*
Heads 34–55-flowered.
Leaves broadly obovate-oblong or oval ; scales acute. 69. *V. Schaffneri.*
Leaves oblong-lanceolate ; scales acuminate. 70. *V. Greggii.*
Leaves tomentose beneath.
Scales acuminate, slightly spreading or revolute. 82. *V. interior.*
Scales acute to rounded, appressed.
Involucre campanulate to hemispheric, 6 mm. high ; scales relatively few ; pappus purple. 81. *V. illinoensis.*
Involucre campanulate to cylindric, 8 mm. high ; scales relatively numerous ; pappus tawny. 83. *V. missurica.*

†† Scales long-acuminate to filiform at the tip.

Heads with 26 flowers or more (see also no. 91, *V. acaulis*).
Pappus straw-colored. GLAUCAE. 88. *V. glauca.*
Pappus purple or tawny-purple. NOVEBORACENSES.
Heads 26–42-flowered ; scales ovate, abruptly tapering into the tip. 89. *V. noveboracensis.*
Heads with 55 flowers or more ; scales lanceolate, gradually tapering to the tip. 90. *V. Harperi.*
Heads with about 21 flowers. PULCHELLAE.
Leaves all or mostly basal. 91. *V. acaulis.*
Leaves scattered over the stem.
Leaves 3–4 times as long as broad, evidently serrate. 92. *V. pulchella.*
Leaves 5–16 times as long as broad, serrulate or entire.
Scales closely appressed at base, recurved at tip. 93. *V. recurva.*
Scales loosely appressed at base, not recurved. 94. *V. scaberrima.*

Section BACCHAROIDES Moench, Meth. 578, as genus. 1794

1. VERNONIA ANTHELMINTICA (L.) Willd. Sp. Pl. 3 : 1634. 1804

Conyza anthelmintica L. Sp. Pl. ed. 2. 1207. 1763.
Baccharoides anthelmintica Moench, Meth. 578. 1794.
Ascaricida indica Cass. Dict. Sci. Nat. 3 : Suppl. 38. 1816.

Type locality: " habitat in India."
Distribution: tropical Asia, introduced in Jamaica.

Section TEPHRODES DC. Prodr. **5**: 24. 1836.

2. VERNONIA CINEREA (L.) Lessing, Linnaea **4**: 291. 1829

Conyza cinerea L. Sp. Pl. 862. 1753.

Type locality: India.
Distribution: tropics of the Old World, and introduced in various portions of tropical America.

Section LEPIDAPLOA Cass. Dict. Sci. Nat. **26**: 16, as genus. 1823

I. LEPIDAPLOA, *Scorpioideae foliatae*

Heads in scorpioid cymes, subtended by bracteal leaves.

(i) Species-group *Argyropappae*

Herbaceous, leaves acute or acuminate, pilose or pubescent beneath; inflorescence lax, of a few spreading cymes; involucre 6–10 mm. high, its scales all straight, loosely imbricated, acuminate or subulate, and more or less pubescent. North American species four, three in Mexico and Central America, and one in the West Indies; others doubtless occur in South America.

3. VERNONIA ARGYROPAPPA Buek, Index Prodr. **2**: v. 1840

Vernonia Poeppigiana DC. Prodr. **5**: 55. 1836. Not *V. Poeppigiana* DC. Prodr. **5**: 20.

Vernonia geminiflora Poepp.; Poepp. & Endl. Nov. Gen. et Sp. **3**: 42. 1845.

Apparently herbaceous, at least 1 m. high; stem striate, sparsely hirsute-pubescent with brown hairs; leaves thin, obovate-lanceolate, 8–12 cm. long, 2–3.5 cm. wide, acuminate, entire or minutely serrulate, gradually narrowed to the almost sessile base, rugose and papillate-pilose above, softly hirsute beneath; upper leaves similar but smaller; inflorescence sparingly branched, of several divaricately spreading cymes bearing each 4–10 heads; bracteal leaves oblong to oblong-lanceolate, otherwise like the cauline, the lowest 4 cm. long, 1.2 cm. wide, the upper smaller; heads about 21-flowered, 2–3 cm. apart; involucre broadly obconic or nearly hemispheric, 8–10 mm. high; scales subulate or the inner narrowly linear, erect, pilose; pappus white, 8 mm. long; achenes 3 mm. long, hirsute.

Type locality: Peru.
Distribution: Vera Cruz to Costa Rica and probably southward into South America.

The identity of the Peruvian type and the Mexican species is accepted on the authority of Hemsley (Biol. Cent. Am. Bot. **2**: 73).

4. Vernonia acilepis Benth. Vidensk. Meddel. 1852: 68. 1852

Herbaceous, erect, 3–4 dm. high; stem thinly pubescent: leaves thin, broadly elliptic or rhombic, 4–6 cm. long, 1.5–2.5 cm. wide, short-acuminate, entire, narrowed at the base into short margined petioles, scabrellate above, sparsely pilose or nearly glabrous beneath; inflorescence of 3–5 lax spreading cymes bearing each 4–8 heads; bracteal leaves oblong to oblanceolate, 2–3 cm. long; heads about 15-flowered (*fide* Bentham), 2–3 cm. distant; involucre narrowly campanulate, 8 mm. high; scales all erect, lanceolate, subulate-tipped, scarious-margined, arachnoid below, puberulent above; achenes not seen; pappus brown.

Type locality and distribution: Costa Rica, *Tonduz 13595*.

5. Vernonia remotiflora Rich. Act. Soc. Hist. Nat. Paris **1**: 112. 1792

Vernonia sessiliflora Willd. Linnaea **4**: 309. 1829.
Vernonia tricholepis DC. Prodr. **5**: 54. 1836.

Herbaceous, 3 dm. high; stem puberulent, prolonged into a single terminal cyme; leaves obovate-lanceolate, 3 cm. long, 1 cm. wide, acuminate, subentire, attenuate to a sessile base, pilose-hispid on both sides, especially beneath; upper leaves reduced and with heads in their axils; involucre campanulate, 8 mm. high; scales erect or appressed, lanceolate, sharply subulate-tipped, sparsely pilose; achenes densely pilose, 2 mm. long; pappus white, the outer series conspicuous.

Type locality: Cayenne.

Distribution: St. Thomas, *Oersted*, to South America.

Very close to *V. acilepis* Benth., but differing in the pubescence of the leaves.

6. **Vernonia hirsutivena** sp. nov.

Apparently herbaceous; stem finely striate, appressed-pubescent; leaves thin, ovate-lanceolate, 7–9 cm. long, 3–4 cm. wide, or the upper smaller, acute or short-acuminate, entire, obtuse or subrotund at base, scabrellate above, thinly and softly pubescent beneath; petioles 3 mm. long; inflorescence small, of a few sparingly branched cymes from the upper axils, which are leafless or with bracts at the branches; heads all sessile, about 21-flowered; involucre nearly hemispheric, 6–7 mm. high; scales pubescent, loosely and irregularly imbricated, the tips erect or somewhat spreading,

lanceolate, the outer subulate tipped, the inner short acuminate; immature achenes hirsute; pappus white, the scales of the outer series broad, conspicuous.

Type: *Gaumer 1325*, from Yot Tzonot, Yucatan; in the herbarium of the New York Botanical Garden.

Related to *V. argyropappa*, but differing in the shape and pubescence of the leaves and the shorter, densely pubescent scales.

(ii) Species-group *Pineticolae*

Heads few, sessile in the axils of the leaves; involucre large, its scales all subulate, erect or somewhat spreading; leaves bullate above, densely tomentose beneath. One species of eastern Cuba.

7. **Vernonia pineticola** sp. nov.

Growing in clumps, several stems from a common base, 2–4 dm. high; stem softly and densely pubescent; leaves spreading or somewhat reflexed, firm, ovate or broadly ovate-oblong, 3–4 cm. long, 1.5–2 cm. wide, obtuse or subacute, entire, rounded at the sessile base, glabrous and very rugose or bullate above, with deeply impressed veins, prominently veined and densely white-tomentose beneath; bracteal leaves similar, but little reduced; heads solitary in the axils of the upper leaves, forming a leafy cyme; involucre broadly campanulate, 8–10 mm. high; scales all loose, erect or somewhat spreading, subulate, pilose near the base, glabrate toward the apex; achenes 2 mm. long, densely hirsute-pubescent; pappus nearly white, 6 mm. long, the outer series 1.5 mm. long.

Type: *Underwood & Earle 1341*, from pine woods, Baracoa, Cuba; in the herbarium of the New York Botanical Garden.

(iii) Species-group *Arborescentes*

Heads sessile in loose spreading or curved leafy cymes, 11–21-flowered; involucral scales acute or acuminate, very loosely and irregularly imbricated in few series; achenes hirsute; pappus white or brown; leaves mainly of an ovate type, pubescent or tomentose, at least beneath. Ten North American species.

8. **Vernonia phyllostachya** (Cass.) nom. nov.

Lepidaploa phyllostachya Cass. Dict. Sci. Nat. **26**: 16. 1823.
Vernonia arborescens DC. Prodr. **5**: 48, in part. 1836.
Vernonia Berteriana DC. Prodr. **5**: 52. 1836.
Vernonia racemosa Delponte, Mem. Accad. Torino II. **14**: 396. 1854.

Vernonia arborescens Lessingiana Griseb. Fl. Brit. W. Ind. 353. 1861.

Suffrutescent, 6–8 dm. high; stems closely appressed-pubescent; leaves oblong-lanceolate to ovate-lanceolate, 5–7 cm. long, 1.5–2.5 cm. wide, acute, entire, obtuse or rounded at the base, sericeous beneath with appressed hairs; bracteal leaves ovate to oblong, equaling or the lower much exceeding the involucre; scales glabrous or nearly so; pappus brown.

Type locality: Porto Rico.

Distribution: Porto Rico, Hispaniola, and St. Thomas.

9. **Vernonia venusta** sp. nov.

Shrubby; stems finely striate, closely appressed-pubescent; leaves deep-green, thin, ovate-oblong, 4–6 cm. long, 1.8–2.8 cm. wide, obtuse or subacute, entire, broadly rounded or subcordate at base, softly pubescent above, villous or subtomentose with white hairs beneath; petioles 1–3 mm. long; cymes numerous, terminal and from the upper axils, divaricately spreading or ascending, 8–16 cm. long, frequently branched; bracteal leaves ovate, sessile or nearly so, 1–2 cm. long, 0.6–1 cm. wide, much exceeding the involucre; heads sessile, 1–1.5 cm. apart, 13-flowered; involucre rather narrowly campanulate, 5 mm. high; scales loosely and irregularly imbricated, all lanceolate or lance-oblong, sharply acuminate, glabrous or the outer with scattered hairs; achenes densely pubescent; pappus white, 5 mm. long.

Type: *Heller 6136*, from near Ponce, Porto Rico; in the herbarium of the New York Botanical Garden.

10. **Vernonia sublanata** sp. nov.

Shrubby; stem slender, striate, thinly pubescent; leaves broadly elliptic or oblong-obovate, 3–3.5 cm. long, 1.2–1.8 cm. wide, acute or obtuse, entire or undulate, narrowed to an obtuse base, rugose and scabrous-pubescent above, closely gray-tomentose beneath; petioles 3–4 mm. long; inflorescence divaricately branched; cymes lax, 5–15 cm. long; bracteal leaves oblong, the upper equaling the involucre, the lower twice as long; heads sessile, 1–2 cm. apart, about 21-flowered; involucre hemispheric, its longest scales 7 mm. long; scales lance-oblong, acuminate, pubescent, green with a scarious margin; achenes densely pubescent, 3 mm. long; pappus pale-tawny, 5 mm. long, the outer series white, conspicuous.

Type: *Britton, Britton & Shafer 784* from Madruga, Cuba; in the herbarium of the New York Botanical Garden.

Vernonia sublanata angustata var. nov.

Resembling the type, but with leaves narrowly oblong, 4 cm. long, 6 mm. wide, obtuse and mucronulate at the tip.

Type: *Underwood & Earle 202*, from Santiago, Cuba; in the herbarium of the New York Botanical Garden.

11. VERNONIA GNAPHALIIFOLIA Rich. in Sagra, Hist. Fis. Pol. Nat. Cuba **11**: 34. 1850

Vernonia arborescens Griseb. Cat. Pl. Cuba 144. 1866. Not *V. arborescens* Sw.

Vernonia Wrightii Griseb *l. c.* Not *V. Wrightii* Sch.-Bip.

Stems incanous; leaves ovate-lanceolate, obtuse or subacute, entire, rounded or attenuate at base, strongly rugose or bullate and scabrellate above, densely tomentose beneath; bracteal leaves resembling the cauline, much exceeding the heads; scales lanceolate, acuminate, pubescent; achenes hirsute.

Type locality: "prope Canasi," Cuba.

Distribution: Cuba, *Wright 1309*, in part.

Wright's collection, *1309*, included two species, one a form with broad, smooth leaves, *V. Sagraeana* DC., and the other with tomentose leaves. The first was taken by Schultz as the type of his *V. Wrightii*. Grisebach, apparently considering that the number included but one species, published the name for the second form, thus introducing the synonyms cited above.

12. VERNONIA ICOSANTHA DC. Prodr. **5**: 49. 1836

Vernonia divaricata Lessing, Linnaea **4**: 306. 1829. Not *V. divaricata* Sw.

Shrubby, branching above; stem finely striate, closely appressed-pubescent; leaves oblong or oblong-lanceolate, 5–7 cm. long, 1.2–2 cm. wide, acute or short-acuminate, entire, narrowed below to an obtuse base, sparsely short-pubescent above, pubescent and with elevated veins beneath; cymes many, terminal and in the upper axils, 6–8 cm. long; bracteal leaves shorter than the involucre, oblong; heads sessile, 1–2 cm. apart, 21-flowered; involucre broadly campanulate to hemispheric, 5 mm. high; scales loosely imbricated, erect or a little spreading, sparsely pubescent, the outer linear-lanceolate, subulate, the inner oblong-lanceolate, acuminate; achenes (immature) pubescent; pappus white, 5 mm. long, the outer series conspicuous, 1 mm. long.

Type locality: "in Martinica."

Distribution: Martinique.

The description above is based on two sheets of *Sieber 190* from Martinique. This is in all probability duplicate material of the specimens upon which Lessing's *divaricata* was based.

13. **Vernonia ventosa** sp. nov.

Vernonia arborescens divaricata Griseb. Fl. Brit. W. Ind. 353, in part. 1861.

Suffrutescent or shrubby, 14–30 dm. tall, branching above; stems striate, softly pubescent; cauline leaves bright-green, thin, ovate-lanceolate, 7–10 cm. long, 2–4 cm. wide, tapering to an acute tip or subacuminate, entire, rounded or broadly obtuse at base, very sparsely strigose-pubescent on both sides; petioles 2–4 mm. long; axile leaves similar; inflorescence loose, of 3–many divaricately spreading, straight or curved, sparingly branched cymes 1–2 dm. long; bracteal leaves lanceolate, long-acuminate, the lower up to 4.5 cm. long and 1.3 cm. wide, the uppermost barely exceeding the involucre; heads 1–1.5 cm. apart, sessile, about 21-flowered; involucre broadly campanulate, 5–6 mm. high; scales loosely and irregularly imbricated, erect or a little spreading, all acuminate, the outer pubescent towards the base and subulate with a carinate midnerve, the inner lanceolate; achenes pubescent, 2 mm. long; pappus white, 5 mm. long, the outer series distinct.

Type: *Duss 303*, *304*, *4069* from Martinique; in the herbarium of the New York Botanical Garden.

Distribution: Martinique, St. Vincent, Guadeloupe.

14. Vernonia borinquensis Urban, Symb. Ant. 3: 390. 1903

Shrubby, 5–30 dm. high, branching above; stem striate, slender, glabrous or nearly so; leaves spreading or somewhat reflexed, firm, ovate to oblong-lanceolate, 4–6 cm. long, 1.5–2 cm. wide, acuminate, entire, somewhat revolute, rounded or obtuse at the base, rugose and scabrous above, pubescent beneath with subappressed hairs, but not sericeous; petioles 2–5 mm. long; axile leaves similar but smaller; inflorescence lax, of numerous spreading, branching, flexuous cymes up to 15 cm. long, the axes more or less pubescent; bracteal leaves resembling the cauline in shape, the lower 2.5–3.5 cm. long, the upper equaling or exceeding the involucre; heads sessile, 1–2 cm. apart, about 18-flowered; involucre 6 mm. high, turbinate-campanulate; scales loosely imbricated, the outer somewhat spreading, lanceolate, acuminate, glabrous or nearly so; achenes 1.5–2 mm. long, densely pubescent; pappus tawny, 5 mm. long.

Type locality and distribution: Porto Rico.

Specimens of the variety *Stahlii* Urban (*l. c.* 391) have not been seen.

15. Vernonia arborescens (L.) Sw. Fl. Ind. Occ. 3: 1320. 1806

Conyza arborescens L. Syst. Nat. ed. 10. 2: 1213. 1759.

Leaves thin, ovate or ovate-lanceolate, subacute to acuminate, sparsely pubescent above, densely so beneath and with elevated reticulated veins; outer scales acuminate, the inner acute or abruptly acuminate; pappus white.

Type locality and distribution: Jamaica.

16. **Vernonia crassinervia** Wright *ined.* sp. nov.

Shrubby; stems striate, puberulent or pubescent, with short internodes, simple or with a few branches; leaves firm, elliptic-oblong, 1.5–2 cm. long, 0.5–1 cm. wide, entire, tapering regularly from the middle to both ends, rugose and scabrellate above, pubescent and with a few prominent veins beneath; cymes 1–3, 1 dm. long or shorter, bearing 2–6 sessile heads, of about 13 flowers; bracteal leaves narrowly oblong, equaling or exceeding the involucre; scales all erect, loosely and irregularly imbricated in few series, lanceolate, sparsely pubescent, scarious on the margins, sharply acuminate; achenes densely hirsute, 2 mm. long; pappus white or brownish, 6 mm. long, the outer series of conspicuous oblong scales.

Type: *Wright 2787*, from Cuba; in the Gray Herbarium; *Combs 745* is identical with it. The species is distinct from all other West Indian species in its short elliptic leaves.

17. Vernonia membranacea Griseb. Cat. Pl. Cuba 144. 1866

Suffrutescent; stem finely pubescent, branching above; leaves thin, spreading, broadly elliptic or ovate-oblong, 5–8 cm. long, 2.5–4 cm. wide, obtuse, entire, obtuse at the base, sparsely pubescent on both sides; petioles 3–5 mm. long; heads in short spreading cymes, subtended by bracteal leaves 1–3 cm. long; involucre campanulate, 6 mm. high; scales lanceolate, acuminate, thinly pubescent; pappus brown.

Type locality and distribution: Cuba.

In shape of leaf and general habit the species greatly resembles *V. albicaulis* Pers.

(iv) Species-group *Araripenses*

Heads in leafy cymes, the involucral scales acuminate or subulate; achenes hirsute; leaves linear to lanceolate or narrowly oblong, several times longer than wide, pubescent beneath. Species of the West Indies and northern South America.

18. Vernonia araripensis Gardn. Lond. Jour. Bot. 5: 222. 1846

Vernonia tricholepis Griseb. Fl. Brit. W. Ind. 354. 1861. Not *V. tricholepis* DC.

Herbaceous or suffrutescent, 5–10 dm. high; stems puberulent; leaves narrowly lanceolate, 4–5 cm. long, 3–5 mm. wide, long-acuminate, subentire, revolute, rugose and scabrellate above, cinereous-pubescent beneath; cymes spreading, 6–15 cm. long; lower bracteal leaves resembling the cauline, the upper much reduced; involucre 5–6 mm. high, its scales very loosely and irregularly imbricated, lanceolate, sharply acuminate, sparsely pubescent; achenes hirsute; pappus yellowish-white, the outer series prominent.

Type locality: Serra de Araripe, Province of Ceara, Brazil.

Distribution: Hispaniola and Jamaica to Brazil, *Wright 286*, *Wright, Parry & Brummel 270*.

19. Vernonia stenophylla Lessing, Linnaea 6: 667. 1831

Herbaceous, erect, 4–5 dm. high; stem pubescent; leaves linear or oblong-linear, 4 cm. long, 2 mm. wide, sparsely pubescent above, canescent beneath, entire, obtuse and mucronulate; heads in spreading terminal cymes; bracteal leaves resembling the cauline, much exceeding the heads; involucre 6–7 mm. high, its scales very irregularly imbricated, lanceolate, pubescent, acuminate into subulate tips; achenes hirsute; pappus nearly white.

Type locality: San Domingo.

Distribution: Cuba and Hispaniola.

The single specimen examined, *Wright 2786*, from Cuba, does not agree in every particular with Lessing's original description, but the differences do not appear sufficient to warrant its separation.

(v) Species-group *Permolles*

Heads numerous, crowded in dense curved cymes, subtended by bracts equaling or shorter than the involucre; leaves strongly rugose above, densely and softly hirsute with long hairs beneath. Two species of Jamaica.

20. **Vernonia permollis** sp. nov.

Vernonia rigida DC. Prodr. 5: 49. 1836. Not *V. rigida* Sw.

Shrubby, branching; stem nearly terete, coarsely tomentose-pubescent; leaves firm, broadly ovate, 6–9 cm. long, 3–5 cm. wide, acute or abruptly short-acuminate, entire, broadly rounded or subcordate at base, rugose above and finely scabrous-pubescent, veins

impressed, pubescent, softly villous beneath with gray or brown hairs, which are most dense along the secondary veins; petioles tomentose, 5–7 mm. long; upper and axile leaves similar but smaller; inflorescence hemispheric or pyramidal; cymes short, crowded, irregularly branching, bearing few heads; bracteal leaves much shorter than the involucre or occasionally wanting; heads sessile, crowded, 11-flowered; involucre campanulate, 4–5 mm. high; scales loosely and irregularly imbricated, the outer lanceolate, acuminate, sparsely pubescent, the inner oblong-lanceolate, acute, the exposed portion glabrous or with a tuft of hairs near the tip; immature achenes densely pubescent; pappus white, 5 mm. long.

Jamaica, *Shreve* (type), and *Maxon 895;* both in the herbarium of the New York Botanical Garden.

21. **Vernonia intonsa** sp. nov.

Shrubby; stems terete, densely tomentose, becoming glabrate with age, freely branching above; rameal leaves thick, ovate-oblong, 2–3 cm. long, 1–1.3 cm. wide, obtuse or subacute, entire, rounded at base, very rugose and under the lens apparently scabrous above, minutely pubescent on the impressed veins, densely villous beneath with gray hairs; petioles 2–3 mm. long; inflorescence a pyramidal cluster of several short compact aggregated cymes, the axes tomentose; bracteal leaves tomentose, equaling or shorter than the heads; heads 4–8 on each cyme, sessile, crowded, 11–13-flowered; involucre campanulate, 4 mm. high; scales irregularly imbricated in a few series, erect, pubescent throughout, the outer triangular-lanceolate, acuminate, the inner oblong-lanceolate, acute; achenes (immature) densely pubescent; pappus white, the outer series distinct.

Type: *Campbell 6091*, from Jamaica; in the herbarium of the New York Botanical Garden.

(vi) Species-group *Fruticosae*

Leaves thick or coriaceous, mostly glabrous and shining above, and frequently revolute; heads large, subtended by bracts approximating the cauline leaves in size and shape; involucre 7–10 mm. high, narrowly campanulate, closely imbricated; achenes usually glabrous. Seven species, of Jamaica, Cuba and Hispaniola.

22. Vernonia fruticosa (L.) Sw. Fl. Ind. Occ. 3: 1323. 1806

Conyza fruticosa L. Sp. Pl. ed. 2. 1209. 1763.
Vernonia rigida Sw. Fl. Ind. Occ. 3: 1322. 1806.

Authentic specimens of this species have not been seen. It is closely related to *V. leptoclada*, but was regarded as distinct by Schultz, and also by Dr. Britton, who examined Jamaican specimens at the Kew Herbarium. Schultz defines it in the following

words: " *Vernonia rigida*, Sw!, cujus specimen auctoris in herbario Schreberiano vidi, planta rigidissima, ab omnibus differt ramis flexuosis, involucro turbinato, imbricatissimo, ½ poll. longo, cum pedunculo brevi pariter squamis obsito obtusis." (Jour. Bot. 1: 233.)

23. VERNONIA LEPTOCLADA Sch.-Bip. Jour. Bot. 1: 233. 1863

Shrubby, branching above, the stems thinly cinereous; leaves rigid, coriaceous, broadly elliptic or oblong, 4–8 cm. long, 2–3 cm. wide, acute, entire or with a few scattered teeth, revolute, rounded at the base, glabrous and very rugose above, puberulent on the veins beneath; heads in long curving cymes; bracts resembling the foliage leaves, the largest 4 cm. long; involucre campanulate, its scales oblong to oblong-lanceolate, pubescent, the outer acute and cuspidate, the inner obtuse.

Type locality and distribution: Cuba, *Wright 284*, in part.

24. VERNONIA SAGRAEANA DC. Prodr. 5: 55. 1836

Vernonia Wrightii Sch.-Bip. Jour. Bot. 1: 234. 1863.

Shrubby, branching above; stems cinereous or becoming glabrous; leaves firm, elliptic to ovate-oblong, 8–10 cm. long, 3–4 cm. wide, acute, sharply denticulate or nearly entire, glabrous on both sides except for some sparse pubescence on the veins; heads in long terminal cymes subtended by bracts resembling the foliage leaves in size and shape; scales closely imbricated, pubescent, the outer triangular-lanceolate, acuminate, the inner oblong, acute; achenes glabrous; pappus sordid-purple.

Type locality and distribution: Cuba, *Wright 284*, in part.

25. VERNONIA INAEQUISERRATA Sch.-Bip. Jour. Bot. 1: 232. 1863

Vernonia inaequiserrata obtusifolia Griseb. Cat. Pl. Cuba 144. 1866.

Vernonia inaequiserrata augustifolia Griseb. *l. c.*

Vernonia rubricaulis Griseb. Mem. Am. Acad. II. 8: 511. 1862. Not *V. rubricaulis* Humbl. & Bonpl.

Stem apparently herbaceous, thinly cinereous-tomentose; leaves firm, narrowly oblong to elliptic-oblong, 6–9 cm. long, 1–2.5 cm. wide, acute or short-acuminate, narrowed or subobtuse at base, irregularly serrate to subentire, rugose and nearly glabrous above, prominently reticulated and cinereous-tomentose beneath; heads in spreading terminal cymes with bracteal leaves about equaling the involucre, or in the axils of the upper foliage leaves; involucre

campanulate-cylindric, 8 mm. high; scales closely imbricated, appressed, thinly arachnoid, ovate to ovate-lanceolate, the inner obtuse or rounded and mucronulate; achenes glabrous, 3.5 mm. long; pappus sordid-purple or tawny.

Type locality and distribution: Cuba.

Schultz's species is based on *Wright 285*. This number, however, includes at least one other species.

26. Vernonia Sprengeliana Sch.-Bip. Jour. Bot. 1: 232. 1863

Stem erect, cinereous-pubescent; leaves crowded, ascending, narrowly oblanceolate, 7–10 cm. long, 1.2–1.8 cm. wide, very rugose and scabrous above, densely tomentose beneath, gradually attenuate from above the middle to a truncate base; heads in short crowded terminal cymes; involucre 10 mm. high, narrowly campanulate; scales all narrowly oblong, the outer acute, the middle and inner rounded and minutely apiculate, all thinly pubescent with scattered hairs.

Type locality and distribution: San Domingo, *Wright, Parry & Brummel 273*.

27. **Vernonia viminalis** sp. nov.

Apparently suffrutescent; stem terete, finely striate, cinereous or tomentose, divaricately branching above; leaves thin, ascending, narrowly oblong or elliptic-oblong, 8–14 cm. long, 1–3 cm. wide, somewhat falcate or asymmetrical, long-acuminate, entire or minutely denticulate, attenuate at base, rugose and scabrellate above, pilose with soft white hairs beneath, reticulately veined; petioles none or very short; cymes numerous, 2–3 dm. long, flexuous; bracteal leaves resembling the cauline, 2–5 cm. long; heads about 29-flowered, sessile, 1.5–3 cm. apart; involucre campanulate, 9–10 mm. high; scales appressed, closely imbricated in many series, the outer ovate-lanceolate, the inner narrowly oblong, all acuminate and sharply cuspidate, the basal portion densely tomentose-ciliate; achenes glabrous, sharply angled, 3.5 mm. long; pappus yellowish-white, 8 mm. long, the outer series minute.

Type: *Wright 285*, from Cuba; in the herbarium of Columbia University.

28. Vernonia Valenzuelana Rich. in Sagra, Hist. Fis. Pol. Nat. Cuba **11**: 33. 1850

Vernonia rigida Valenzuelana Griseb. Cat. Pl. Cuba 144. 1866.

Stems woody, thinly pubescent; leaves rigid, coriaceous, narrowly oblong or linear-oblong, 8–10 cm. long, 0.8–1.7 cm. wide, acute, entire or remotely denticulate, revolute, truncate or rounded or sub-

cordate at base, rugose but glabrous and shining above, puberulent and prominently reticulate beneath; heads in long cymes; bracteal leaves resembling the cauline, 3–5 cm. long; involucre campanulate-cylindric, 8–9 mm. high; scales all appressed, arachnoid-ciliate, tapering to a cuspidate tip.

Type locality and distribution: Cuba, *Wright 2785*.

(vii) Species-group *Divaricatae*

Heads in leafy cymes, 11–18-flowered; scales obtuse or subacute; leaves thinly pubescent or nearly glabrous. Three species, all Jamaican.

29. VERNONIA DIVARICATA Sw. Fl. Ind. Occ. 3: 1319. 1806

Vernonia acuminata Lessing, Linnaea 6: 663. 1831.

A straggling shrub, 1.3–1.6 m. high, with slender, striate, pubescent, branching stems; leaves thin, bright-green, elliptic, 5–6 cm. long, 1.3–1.8 cm. wide, long-acuminate, entire, narrowed at the base, sparsely and minutely pubescent on both sides, paler green beneath; inflorescence of numerous lax, divaricately spreading, many headed cymes; lower bracteal leaves approximating the cauline in size and shape, the uppermost 1–2 cm. long; heads sessile, distant, 11-flowered; involucre campanulate, 4–5 mm. high; scales appressed, irregularly imbricated, nearly glabrous, the outer ovate-lanceolate, acute, the inner oblong, tapering to an obtuse or subacute tip; achenes densely pubescent, 2 mm. long; pappus rufescent, 4–5 mm. long.

Type locality and distribution: Jamaica.

Lessing's *V. acuminata* is described with aggregated heads, resembling *Nichols 20* and *120*, a character possibly due merely to habitat, since the latter grew at an altitude of 5,000–7,400 feet.

30. Vernonia albicoma sp. nov.

Stem woody, striate, glabrous or puberulent, slender; leaves thin, bright-green, elliptic or elliptic-lanceolate, 5–6 cm. long, 1.5–2.3 cm. wide, acuminate, subentire, tapering at the base, glabrous to the touch above, but finely pubescent under the lens, very finely pubescent or glabrous beneath; petioles 5–7 mm. long; upper leaves somewhat reduced; inflorescence of 1–3 curved spreading terminal cymes bearing each 5–10 sessile 18-flowered heads; bracteal leaves lance-oblong, the middle ones about equaling the involucre, which is broadly campanulate or hemispheric, 5 mm. high; scales erect, loosely and irregularly imbricated, nearly glabrous, the outer lanceolate, acuminate; the inner oblong, acute; achenes densely pubescent; pappus white.

Type: *Campbell 6152*, from Jamaica; in the herbarium of the New York Botanical Garden.

31. **Vernonia expansa** sp. nov.

A straggling shrub 2.5–3 m. high, branching above; stems slender, striate, puberulent; leaves numerous, rather crowded, thin, divaricate, ovate, 3–5 cm. long, 1.7–2.7 cm. wide, acute or subacuminate, entire, obtuse or broadly rounded at base, sparsely and finely pubescent, or nearly glabrous above, the veins elevated on the upper side; petioles 3 mm. long; upper and axile leaves smaller, broadly elliptic, obtuse; inflorescence of several short cymes terminating the branches and in the upper axils, bearing each 3–6 heads; bracteal leaves equaling or much shorter than the involucre; heads crowded, sessile, 11-flowered; involucre broadly campanulate, 4 mm. high; scales all appressed, closely imbricated, glabrous or nearly so, the outer broadly ovate, the inner lance-oblong, all rounded at the tip; achenes 2 mm. long, densely gray-pubescent; pappus brown.

Type: *Harris 8796*, from Jamaica, altitude 2,000 feet; in the herbarium of the New York Botanical Garden.

(viii) Species-group *Longifoliae*

Heads sessile, crowded in short divaricate cymes bearing each 1–7 heads, subtended by bracts resembling the cauline leaves in size and shape; leaves various in shape, thinly pubescent. Three species, extending from the Windward Islands to Hispaniola.

32. Vernonia longifolia Pers. Syn. **2**: 404. 1807

Vernonia punctata Sw. Kgl. Vet. Acad. Stockh. Handl. **1827**: 72. 1828.

Leaves elliptic to elliptic-lanceolate, 6–11 cm. long, 2–4 cm. wide, acuminate or rarely acute.

Type locality: Guadeloupe.

Distribution: Guadeloupe, St. Kitts, Martinique, Dominica.

33. Vernonia albicaulis Pers. Syn. **2**: 404. 1807

Eupatorium obtusifolium Willd. Sp. Pl. **3**: 1768. 1804.

Conyza glabra Willd. *l. c.* 1940.

Vernonia emarginata Wikstr. Kgl. Vet. Acad. Stockh. Handl. **1827**: 73. 1828.

Vernonia Vahliana Lessing, Linnaea **4**: 306. 1829.

Vernonia longifolia Vahliana Urban, Symb. Ant. **1**: 456. 1900.

Leaves broadly obovate-elliptic, 2.5–6 cm. long, 1.5–3.5 cm. wide, obtuse or emarginate, rarely subacute.

Type locality: St. Croix.

Distribution: Hispaniola, Porto Rico and St. Croix.

34. **Vernonia Sintenisii** (Urban) sp. nov.

Vernonia longifolia Sintenisii Urban, Symb. Ant. 1: 456. 1900.

Shrubby, 2 m. high; mature stems glabrate or thinly tomentose, young shoots and inflorescence closely tomentose; leaves firm, somewhat crowded, oblong, 2–4 cm. long, 0.6–1.3 cm. wide, acute or rounded at the tip, tapering to an acute or obtuse base, entire or somewhat revolute, pubescent beneath, sparsely pubescent and more or less resinous-dotted above; petioles 2 mm. long; bracteal leaves broadly oblong, rounded at base and apex, not over 1 cm. long or 0.7 cm. wide; inflorescence corymbiform, composed of a few short aggregated cymes bearing each 1–3 sessile heads; involucre broadly campanulate, loosely and irregularly imbricated, 4–5 mm. high; scales erect, oblong-lanceolate, acuminate, pubescent; achenes 2.5 mm. long, densely pubescent; pappus tawny or pale brown, 4 mm. long, the outer series conspicuous.

Type locality: Porto Rico.

Distribution: Porto Rico, *Sintenis 3727, 4721.*

(ix) Species-group *Schiedeanae*

Heads large, many flowered; involucres broad, 8–10 mm. high, the scales very many, closely imbricated in many series; leaves oblong-lanceolate, thick or coriaceous, generally shining above. At least two, and probably the third also, are climbing woody vines. Three species, from Mexico south to Panama.

35. Vernonia Schiedeana Lessing, Linnaea 6: 399. 1831

Shrubby, climbing, 1–3 m. high; leaves oblong-lanceolate, coriaceous, 10–15 cm. long; scales of the involucre ciliate, somewhat constricted near the tip and then dilated into a flat, broadly rounded or emarginate, scarious, spreading tip 2–3 mm. wide.

Type locality: "in dumetis Papantlae et Misantlae," Mexico.

Distribution: from Vera Cruz south to Honduras.

36. Vernonia Seemanniana Steetz, in Seem. Bot. Voy. Herald 139. 1854

Climbing shrub; stems striate, pubescent; leaves subcoriaceous, ovate-lanceolate to oblong-lanceolate, 8–10 cm. long, 2.5–4 cm. wide, sharply acuminate, entire and frequently somewhat revolute,

rounded or obtuse at the base, glabrous and shining but rugose above, minutely puberulent below, with prominent reticulated veins; inflorescence of numerous spreading cymes 1–2 dm. long; heads sessile, 1–1.5 cm. distant; involucre broadly campanulate, 8 mm. high; scales closely imbricated, the outer triangular-lanceolate, ciliate and puberulent, with a prominent midvein, the inner lanceolate, tapering to a flat, obtuse, spreading tip 1 mm. wide; achenes 2 mm. long, hirsute with erect white hairs; pappus nearly white, 5 mm. long, the outer series very distinct.

Type locality: " Volcano of Chiriqui, Veraguas."

Distribution: Costa Rica, *Pittier 3706, 3727, 4931, 6887*, south to Panama.

In general habit and foliage much like *V. Schiedeana*, but with more pubescent involucre and differently shaped scales.

37. Vernonia vernicosa Klatt, Bull. Soc. Roy. Bot. Belg. **35**: 294. 1896

Shrubby, erect (? or climbing); stems striate, glabrous; leaves oblong-lanceolate, 8–10 cm. long, 2.5 cm. wide, coriaceous, acuminate, entire, rounded at the base, pinnately veined, glabrous on both sides; petioles 3–4 mm. long; upper leaves somewhat reduced; inflorescence loose, the cymes few, flexuous; bracteal leaves oblong, puberulent beneath, the largest 3 cm. long, 1 cm. wide; many heads not bracteate; heads nearly sessile, distant, 50-flowered, *fide* Klatt; involucre campanulate-cylindric, 10 mm, high; outer scales lanceolate, the intermediate ovate-lanceolate, the inner oblong, in many series, regularly imbricated, erect or barely spreading, glabrous, green, scarious-margined, acuminate; achenes (immature) densely hirsute; pappus white, 7 mm. long, the outer series large, distinct.

Type locality: Rio Varilla, Costa Rica.

Distribution: Costa Rica, *Pittier 9860, 7013, 7065, Hoffmann 305*.

Vernonia vernicosa comosa Greenman, Proc. Am. Acad. **39**: 93. 1903

Resembling the type, but with pubescent stem and strigose-hirsute leaves.

Type locality and distribution: Costa Rica, *Tonduz 13607*.

II. Lepidaploa, *Scorpioideae reductae*

§ *Leptospermoides* DC. Prodr. **5**: 17. 1836.

Heads in reduced scorpioid cymes, the individual cymes with few heads or frequently but one, in which case they appear solitary

and scattered among the upper foliage leaves. West Indian shrubs, with freely branched stems and mostly obtuse or rounded leaves.

38. Vernonia lepidota Griseb. Cat. Pl. Cuba 145. 1866

Suffrutescent or frutescent, ascending, 3 m. high; stems and branches closely brown-tomentose; leaves oblong or obovate-oblong, 5–9 cm. long, 2–4 cm. wide, obtuse or rounded at the apex, entire, narrowed below into short petioles, green and lepidote above, brown and densely lepidote, with prominent veins, beneath; inflorescence of subcapitate clusters; heads short-peduncled, about 21-flowered; involucre broadly campanulate, 5–6 mm. high; scales closely imbricated in few series, all acute or subacute and pubescent, the inner oblong, the outer triangular-lanceolate; "achenes smooth; pappus white."

Type locality: "Cuba or., pr. Baracoa, in vertice montis Yunque."

Distribution: Cuba.

The type specimen has apparently immature heads on strongly angled connivent peduncles 1 cm. long, subtended by short oblong bracts.

39. Vernonia complicata Griseb. Cat. Pl. Cuba 143. 1866

A densely branched shrub, 5 dm. high; stem nearly terete, leafy, closely and softly tomentose; leaves thick, rotund or very broadly obovate, 5–6 mm. long and wide, entire, tomentose on both sides, complicate, abruptly contracted into margined petioles 3–4 mm. long; heads sessile, solitary among the upper leaves, about 8-flowered; involucre campanulate, 5 mm. high; scales loosely and irregularly imbricated, tomentose on the back, acuminate, the outer ovate-lanceolate, the inner lanceolate; achenes densely hirsute, 2 mm. long; pappus nearly white, 4 mm. long.

Type locality and distribution: eastern Cuba.

40. Vernonia arctata Gleason, Bull. Torrey Club 33: 185. 1906

Shrubby, much branched, 3–8 dm. high; leaves broadly elliptic to obovate-oblong, acute or mucronate, entire, acute or obtuse at the base, brown-tomentose beneath, glabrate above, 1–1.8 cm. long, 0.6–1.1 cm. wide; inflorescence flattened, consisting of several short leafy irregular scorpioid cymes; involucre campanulate, 4–5 mm. high; scales lanceolate, acute, tomentose; achenes pubescent, 2.5 mm. long; pappus nearly white.

Type locality and distribution: New Providence Island, Bahamas.

41. Vernonia obcordata Gleason, Bull. Torrey Club **33**: 187. 1906

A much branched shrub 6–9 dm. high, with stiff crooked branches; leaves crowded, broadly obcordate, 0.8–1.5 cm. long, 0.7–1.5 cm. wide, entire, narrowed at the base into petioles 5 mm. long; heads few, single, sessile among the upper leaves; involucre campanulate, 4–5 mm. high; scales ovate-lanceolate or the inner narrower, acute, tomentose; achenes densely hirsute, 2–2.5 mm. long; pappus yellow.

Type locality and distribution: Little Inagua Island, Bahamas.

42. Vernonia bahamensis Griseb. Fl. Brit. W. Ind. 352. 1861

Shrubby, 2 m. tall, repeatedly branched; leaves crowded, spatulate, oblanceolate or narrowly obovate, entire, rounded at the tip, and varying from mucronate to slightly retuse, narrowed at the base into margined petioles, 2–3.5 cm. long, including the petiole, 0.5–1.2 cm. wide; heads few, single, sessile among the upper leaves, 8–13-flowered; involucre campanulate, 3–4 mm. high; scales ovate-lanceolate, tomentose, sharply acute; achenes densely hirsute, 2–2.5 mm. long; pappus nearly white.

Type locality and distribution: Bahama Islands.

III. Lepidaploa, *Scorpioideae aggregatae*

Heads large, sessile or very short-peduncled, aggregated in dense subcapitate clusters terminating the stems and branches. Species 3 or 4, of Cuba, Hispaniola, and possibly of St. Thomas.

43. Vernonia buxifolia (Cass.) Lessing, Linnaea **4**: 313. 1829

Lepidaploa buxifolia Cass. Dict. Sci. Nat. **26**: 18. 1823.
Proustia domingensis Spreng. Syst. **3**: 502. 1826.
Vernonia domingensis DC. Prodr. **5**: 30. 1836.

Tall woody vine climbing on trees; branches glabrous, the young twigs pubescent; leaves coriaceous, elliptic-oblong or oblong-obovate, 2–3 cm. long, 1–1.5 cm. wide, acute, entire and somewhat revolute, narrowed at base into petioles 1–2 mm. long, glabrous on both sides, shining above; inflorescence subcapitate; heads 3–6, sessile or on short peduncles covered with scales like those of the involucre; involucre obconic or turbinate, narrowed below, 8 mm. high; scales regularly and closely imbricated in about ten series, appressed, glabrous, obtuse to subacute or somewhat fimbriate, the outer ovate, the inner ovate-lanceolate, the innermost acuminate; achenes obtusely ribbed, sparsely pubescent; pappus nearly white, 5 mm. long, the outer series conspicuous.

Type locality and distribution: San Domingo.

44. **Vernonia montana** sp. nov.

Climbing shrub, 6 m. high; branches glabrous, young twigs puberulent; leaves crowded, firm, oblong-elliptic or rhomboid, 8–13 mm. long, 5–8 mm. wide, acute to rounded at the apex, entire, somewhat revolute, cuneate at base, dark-green and glabrous on both sides, one-nerved or with faint lateral veins, sessile or with petioles 1–2 mm. long; inflorescence subcapitate; heads 2–5, sessile or nearly so, 8-flowered; involucre 5 mm. high, campanulate, rounded at the base; scales regularly imbricated in few series, appressed, obtuse or subacute, glabrous, the outer broadly ovate, the inner ovate-lanceolate to lanceolate; achenes obscurely ribbed, nearly glabrous, 3 mm. long; pappus yellowish, 4 mm. long, the outer series minute.

Type: *Nash & Taylor 1756*, from La Brande to Mt. Balance, Haïti; in the herbarium of the New York Botanical Garden.

45. **Vernonia yunquensis** sp. nov.

Erect, sparingly branched, 1.2 m. tall; stem obscurely angled, very thinly but closely canescent; leaves scattered, firm, dull-green above, pale beneath, broadly elliptic, 4–5 cm. long, 1.8–2.7 cm. wide, obtuse or mucronate, entire, obtuse or acute at base, glabrous and somewhat rugose above, closely gray-tomentose with prominently reticulated veins beneath; heads about 5, sessile or nearly so in a terminal capitate cluster, about 34-flowered; involucre campanulate, 7 mm. high; scales closely imbricated in several series, red or purple, gray-tomentose on the back, acute or subacute and mucronate, the outer broadly ovate, the inner ovate-lanceolate to lanceolate; achenes (immature) hirsute with appressed hairs; pappus 5 mm. long, nearly white, the short outer series conspicuous.

Type: *Underwood & Earle 661*, from El Yunque Mt., Baracoa, Cuba; in the herbarium of the New York Botanical Garden.

46. Vernonia Thomae Benth. Vidensk. Meddel. **1852**: 66. 1852

No specimens of this species have been seen. From Bentham's description it cannot be distinguished from *V. albicaulis* in leaf-character; a drawing in the Gray Herbarium from the collection of Dr. Klatt also refers to that species; and its distribution is suggestive of the same, while quite different from the remaining species of the subsection.

Type locality and distribution: St. Thomas.

IV. Lepidaploa, *Scorpioideae aphyllae*

Heads in scorpioid cymes, not subtended by bracteal leaves. Species mainly Mexican and Central American, only the first two from the West Indies.

(i) Species-group *Havanenses*

Heads about 11-flowered, sessile, in branching, leafless, scorpioid cymes; leaves broad, serrate or nearly entire. Two species, one of Cuba, the other of St. Vincent, which are possibly not related. Their inclusion in the same species-group is largely a matter of convenience, these being the only species of the subsection found in the West Indies.

47. Vernonia havanensis DC. Prodr. **5**: 37. 1836

Vernonia Ottonis Sch.-Bip. Linnaea **20**: 508. 1847.
Vernonia hieracioides Griseb. Mem. Am. Acad. **8**: 511. 1860.
Vernonia cubensis Griseb. Cat. Pl. Cuba 144. 1866.
Vernonia stictophylla Wright; Sauv. Anal. Acad. Ci. Habana **6**: 176. 1869.

Stem woody, erect, branching, reaching a height of 4 m.; branches striate, thinly pubescent or glabrate; leaves numerous, firm, oblong to oblong-obovate, 6-10 cm. long, 2–3½ cm. wide, abruptly short-acuminate or acute, obscurely serrate, obtuse or acute at base, sessile or very short-petioled, scabrous above, puberulent beneath, especially along the veins; upper leaves smaller; inflorescence 1 dm. across, leafy, corymbiform, of short branching cymes; lower heads peduncled, the upper sessile; involucre obconic or campanulate, 4–5 mm. high; scales appressed, regularly imbricated in few series, glabrous, the outer lanceolate, acuminate, the inner oblong, rounded to subacute and frequently mucronate; achenes pubescent, sharply ribbed, 2.5 mm. long; pappus yellowish, 5 mm. long.

Type locality: "Cuba juxta Havanam."

Distribution: Cuba.

Vernonia stictophylla is based on a form with large, thin, obovate leaves, which are conspicuously attenuate at the base. It does not appear to be specifically distinct.

48. **Vernonia pallescens** sp. nov.

Frutescent, branching above, height not reported; branches striate, thinly puberulent or glabrate; leaves membranous, thin, elliptic, 8–10 cm. long, 2.5–4.5 cm. wide, long-acuminate, sharply serrate on the upper half, less so or entire below, narrowed at

the base into short petioles, glabrous on both sides, paler green and glaucescent beneath; inflorescence sparingly branched, leafless; heads all sessile; involucre obconic or narrowly campanulate, 4 mm. high; scales few, loosely imbricated, appressed, the outer narrowly lanceolate, pubescent at the acuminate tips, the inner oblong-lanceolate, acute, nearly glabrous; achenes 2 mm. long, obscurely angled, pubescent; pappus rufescent, 5 mm.long.

Type: *Smith & Smith 992*, from St. Vincent Island; in the herbarium of Columbia University.

(ii) Species-group *Scorpioides*

Heads in short or long, straight or curved, mostly unbranched cymes, about 21-flowered; leaves broad, thin, acute or acuminate. Species of South America, extending north to Nicaragua and Costa Rica.

49. Vernonia brachiata Benth. Vidensk. Meddel. **1852**: 67. 1852

Apparently herbaceous; branches glabrate, strongly angled; leaves thin, broadly elliptic, 10–13 cm. long, 4–6 cm. wide, or the lower much larger, acute or subacuminate, serrulate or entire, gradually attenuate to an obtuse base, nearly glabrous on both sides, short-petioled; inflorescence 1–3 dm. high, freely branched; cymes 1–2 dm. long, straight; heads sessile, 21-flowered, less than 1 cm. apart; involucre campanulate, 3–4 mm. high; scales loosely imbricated, the outer triangular-lanceolate, the inner oblong to oblong-lanceolate, all acute and ciliate; achenes sparsely short-hirsute; pappus tawny-yellow.

Type locality: Costa Rica.

Distribution: Costa Rica, *Pittier 3740*, *6716*, *9315*, and south into South America.

Distinguished from *V. scorpioides* by the attenuate obtuse leaf-bases and short petioles.

50. Vernonia scorpioides (Lam.) Pers. Syn. **2**: 404. 1807

Conyza scorpioides Lam. Encyc. **2**: 88. 1786.

Shrubby; branches terete, softly pubescent; leaves ovate, long-acuminate, abruptly narrowed into a short cuneate base, pubescent beneath; petioles 2–3 cm. long; cymes short, crowded, curved.

Type locality: Brazil.

Distribution: Nicaragua, *Lévy 370*, and throughout tropical South America.

(iii) Species-group *Deppeanae*

Heads 8–21-flowered, in dense, freely branching, leafless, scorpioid cymes; leaves petiolate, entire or nearly so, usually pubescent or tomentose beneath. Mexican and Central American species.

51. Vernonia Aschenborniana Schauer, Linnaea **19**: 714. 1847

Shrubby, 2–5 m. tall; stem striate or obscurely angled, ferruginous-pubescent; leaves firm, oblong to lance-oblong, 6–10 cm. long, 2–3 cm. wide, acute, entire or remotely serrulate, somewhat revolute, narrowed at base, scabrous-puberulent above, thinly pubescent beneath with rusty hairs, especially on the veins; petioles pubescent, 2–3 mm. long; inflorescence hemispheric or pyramidal, freely branched, 2–3 dm. wide; heads all sessile or nearly so; involucre broadly campanulate to hemispheric, spreading with age, 3 mm. high; scales loosely imbricated in few series, more or less pubescent and ciliate, cuspidate, the outer broadly ovate, the inner ovate-lanceolate; achenes sharply ribbed, pubescent, 2 mm. long; pappus tawny-yellow, 5 mm. long.

Type locality: Mexico.

Distribution: southern Mexico, Guatemala and Nicaragua.

Forms with oblong-oblanceolate leaves 10 cm. long, 2–3 cm. wide, nearly glabrous beneath and long-attenuate at base were regarded by Schultz as a variety of *V. Aschenborniana*. They occur from Mexico, *Liebmann 355*, *Pringle 3607*, to Guatemala, *Watson 434*, *466a*.

52. Vernonia Deppeana Lessing, Linnaea **6**: 398. 1831

? *Vernonia stellaris* La Llave & Lex. Nov. Veg. Descr. **1**: 22. 1824.

? *Vernonia fragrans* La Llave & Lex. *l. c.*

Shrubby, freely branching; branches pubescent or tomentose, terete; leaves thin, oblong or narrowly elliptic, 8–10 cm. long, 2.5–3.5 cm. wide, acute, entire or obscurely serrate, narrowed or rounded at base, scabrous above, tomentose or floccose with ferruginous hairs beneath; petioles tomentose, 8–12 mm. long; inflorescence widely branched, pyramidal or hemispheric, 1–3 dm. wide, its branches spreading; heads sessile, 18–21- or rarely 11-flowered; involucre campanulate, 3–4 mm. high; scales loosely imbricated, somewhat spreading at the apex, the outer ovate, acute, pubescent, the inner oblong, acute or subacute, glabrous or ciliate; achenes 2.5 mm. long, sharply ribbed, pubescent; pappus tawny, 5 mm. long.

Type locality: Misantla, Mexico.

Distribution: central and southern Mexico, Guatemala, Costa Rica.

Broad-leaved plants from Costa Rica, *Pittier 93*, *1982*, have been distributed as *Vernonia mollis* H.B.K.

53. VERNONIA PATENS H.B.K. Nov. Gen. 4: 41. 1818

? *Vernonia lanceolaris* DC. Prodr. 5: 37. 1836.

? *Vernonia pacchensis* Benth. Pl. Hartw. 134. 1839.

Tall shrub; stem and branches striate or angled, thinly tomentose; leaves firm, oblong, lanceolate or narrowly oblong-lanceolate, 10 cm. long, 3 cm. wide, those of the branches only 1–1.5 cm. wide, acuminate, entire or undulate, somewhat revolute, narrowed at base into petioles 2–3 mm. long, glabrous and somewhat shining but rugose above, pubescent beneath, especially on the prominent reticulated veins; inflorescence lax, spreading, 1–1.5 dm. wide; heads all sessile or nearly so, 21-flowered; involucre hemispheric, 4 mm. high; scales coriaceous, loosely imbricated in few series, the outer broadly ovate, blunt, ciliate, the inner ovate-lanceolate or oblong, glabrous or ciliate, rounded or obtuse and minutely cuspidate; achenes obscurely angled, 2 mm. long, pubescent; pappus tawny-yellow, 5 mm. long, the outer series distinct but short.

Type locality: "In America meridionali."

Distribution: southern Mexico to Nicaragua and South America.

A form with leaves narrowly lance-oblong to elliptic, 12–20 cm. long, 2–4 cm. wide, very thin and glabrous, has been distributed as *V. lanceolaris* DC. It is perhaps merely a glabrous-leaved form of *V. patens*. Chiapas, *Nelson 3815;* Nicaragua, *Baker 2257*.

The three preceding species are closely related and so confused by intergrading variations that their separation is extremely difficult. *V. Deppeana* is perhaps the most easily recognized because of its elliptic, softly cinereous-tomentose leaves. In general habit, foliage and involucre *V. Aschenborniana* and *V. patens* are much alike, and the principal distinction, based on the number of flowers in the head, is possibly not a legitimate one. No authentic specimens have been examined, so that the exact status of the species and the four supposed synonyms is not certain. *Vernonia mollis* H.B.K. and *V. cordata* H.B.K. also belong in this species-group. A fragment of the latter in the Gray Herbarium closely resembles *V. Deppeana* except for the subcordate leaves, and *V. mollis* also is possibly a form of the same species.

54. VERNONIA CANESCENS H.B.K. Nov. Gen. 4: 35. 1818

Vernonia bullata Benth. Vidensk. Meddel. 1852: 67. 1852.

Apparently suffrutescent and erect, simple to the inflorescence or sparingly branched above; stems pubescent or becoming glabrous; leaves thin, oblong-lanceolate, 8–18 cm. long, 2–5 cm. wide, long-acuminate, entire, narrowed at the base, rugose or nearly flat, scabrellate or glabrous above, prominently reticulate and softly strigose-pubescent beneath; petioles 3–5 mm. long; inflorescence large, lax, 1–3 dm. wide, its branches few, divaricate, 8–20 cm. long; heads sessile, about 1 cm. distant, 21-flowered; involucre campanulate, 4–5 mm. high; scales loosely and irregularly imbricated, all erect, lanceolate, hirsute, acuminate into subulate tips; achenes 2 mm. long, hirsute with erect hairs; pappus white, 4 mm. long.

Type locality: Peru.

Distribution: from southern Mexico to tropical South America.

The abundant material at hand for examination showed that this species was extremely variable, and an unbroken series of forms could be traced from plants with the habit described above, narrow, nearly flat leaves attenuate at both ends and barely scabrellate above, to others of strikingly different character. As examples of plants corresponding most closely to the description and plate of Kunth may be cited the following: *Ervendberg 47*, Tantoyuca, Mexico; *Donnell Smith 2837*, Zacatepéquez, Guatemala; *Nelson 3797* and *3798*, Chiapas, Mexico; *Tonduz 11733*, *Pittier 6886* and *3697*, from Costa Rica; and *Fendler 160*, from Panama. Approximating the type in the shape of the leaves, but with less attenuate or even subrotund base, more prominent veins and harsher pubescence are *Palmer 492*, Acapulco, Mexico; *Lehmann*, Guatemala; *Pittier 1660*, *Tonduz 1805*, *7197*, *7304* and *11626*, Costa Rica. As extreme forms may be mentioned a sheet from Panama collected by Seemann, and two from Costa Rica, *Donnell Smith 4867* and *Cooper 5839*. These have short, subacuminate to obtuse, subcordate leaves, very scabrous and bullate above, with exceedingly prominent veins and dense strigose pubescence beneath. *Cooper 5839* was collected in Cartago, the type locality of *Vernonia bullata* Benth., with which it agrees in every particular. Compared with a typical form these seem abundantly distinct, but the intergrading forms indicate that they are merely an aberrant form. Another interesting variation is presented by *Pittier 4930* from Costa Rica, in which the leaves are small, narrowly oblong-lanceolate, and densely and softly pubescent above.

V. Lepidaploa, *Paniculatae dichotomae*

Inflorescence paniculate, dichotomously branched, the corresponding internodes of equal length. One species.

55. Vernonia menthaefolia (Poepp.) Lessing, Linnaea 4: 268. 1829

Eupatorium menthaefolium Pöpp. in Sprengel, Syst. Veg. 3: 412. 1826.

Vernonia Grisebachii Sch.-Bip. Jour. Bot. 1: 231. 1863.

Stem woody, erect, 1–2 m. high, minutely puberulent; leaves thin, bright-green, ovate-oblong, 5–10 cm. long, 1.5–3.5 cm. wide, acute or acuminate, entire, undulate or sparsely serrate with low teeth, broadly cuneate to subrotund at base, scabrellate above, nearly glabrous and paler green beneath; petioles 1–1.5 cm. long; bracteal leaves similar but smaller; inflorescence loose, pyramidal, 2–3 dm. wide, dichotomously branched; heads 11–18-flowered, on peduncles 3–5 mm. long; involucre broadly campanulate, closely imbricated, 4–5 mm. high; scales coriaceous, puberulent, the outer short, ovate, obtuse or acute, the inner oblong-lanceolate, rounded and cuspidate; achenes 3 mm. long, minutely pubescent on the low ribs; pappus flavescent or nearly white, 6 mm. long, the outer series short, indistinct.

Type locality and distribution: Cuba.

This, the single species of the subsection, is distinguished not only by the structure of its inflorescence, but also by its distribution. It is the only paniculate form in the West Indian region, with the single exception of *V. insularis*, and is doubtless phylogenetically distinct from all the remaining Paniculatae. The exception mentioned is, as has been shown, of Mexican origin. Schultz's *V. Grisebachii* was intended to include forms with larger heads and more numerous flowers, but from his description cannot be distinguished from authentic specimens of *V. menthaefolia*.

VI. Lepidaploa, *Paniculatae umbelliformes*

Branches of the panicle mostly aggregated or separated only by shortened internodes; peduncles approximately uniform in length, the inflorescence consequently appearing subumbellate. The heads form regular rounded clusters which are in turn united into large pyramidal, hemispheric or depressed inflorescences. The subsection is a very natural one; its nine component species are closely interrelated, and are all endemic to the mountain regions of Mexico.

56. Vernonia corymbiformis DC. Prodr. 5: 62. 1836

Erect shrub, divaricately branched above; stem striate, glabrous or puberulent; leaves ample, thin, bright-green, elliptic, 8–12 cm. long, 3–5.5 cm. wide, acute or subacuminate, entire, narrowed at the base, almost glabrous on both sides, prominently veined; petioles 1–2 cm. long; upper leaves similar but smaller; inflorescence depressed-hemispheric; involucre obconic-campanulate, 8 mm. high; scales loosely imbricated, straight, erect or the outer spreading, all linear-subulate, glabrous, more or less tinged with purple; immature achenes glandular, obtusely ribbed; pappus almost white, 6 mm. long.

Type locality and distribution: Mexico.

To this species Mr. J. M. Greenman has referred the plant described above, *Nelson 4098*, collected in the state of Jalisco. That this identification is correct is by no means certain. De Candolle's description of this species and the following are almost identical, the only points of difference being in the pubescence of the leaves, and the width and texture of the scales; although these differences are by no means striking. So far as can be decided from the description alone the plant in question most nearly resembles *V. corymbiformis*. It is at once separated from *V. Karwinskiana* by the larger broader leaves and the straight subulate scales.

57. Vernonia Karwinskiana DC. Prodr. 5: 62. 1836

Erect, 1 m. high; stem purple, glabrous to puberulent; leaves firm, ovate-lanceolate to oblong, 3–10 cm. long, 1.5–3 cm. wide, scabrous above, pubescent beneath, at least on the veins; inflorescence depressed-hemispheric; scales linear-lanceolate or narrowly oblong, tapering to an acute or subacute tip, thin, appressed at base, loose and a little spreading at tip.

Type locality and distribution: Mexico.

Two forms of distinct leaf-habit occur. In the first the leaves are narrowly oblong or elliptic-oblong, tapering at both ends, and about five times as long as wide. In the other they are ovate-lanceolate, abruptly narrowed to an obtuse base, and about three times as long as wide. In involucral character they are apparently the same.

58. **Vernonia jaliscana** sp. nov.

Stem suffrutescent, about 1 m. high, erect from a thick woody base, simple to the inflorescence, nearly terete, scabrellate or becoming glabrous; leaves thick, subcoriaceous, elliptic-oblong, 7–11 cm. long, 2.5–4.5 cm. wide, obtuse or subacute, entire or undulate,

obtuse to rounded or subcordate at base, scabrous on both sides, especially above; petioles about 5 mm. long; upper leaves much reduced, the axiles and rameals only 1–2 cm. long; branches of the hemispheric or depressed inflorescence pubescent; peduncles about 1 cm. long; heads 21-flowered; involucre broadly campanulate, 7 mm. high; scales closely imbricated, appressed, glabrous, the exposed portion purple, the outer lanceolate, cuspidate, the inner narrowly oblong, attenuate or sharply acute, mucronulate; achenes 3 mm. long, glandular-puberulent, sharply ribbed; pappus nearly white, 7 mm. long, outer series indistinct.

Type: *Pringle 2165* from Guadalajara, Jalisco; in the Gray Herbarium. Here are also referred *Pringle 2984* and *9994*, from the same locality, and *Palmer 745* from Rio Blanco, Jalisco. One sheet of *Pringle 9994* has narrowly oblong-oblanceolate leaves narrowed at the base. In other respects it is like the type, and a second sheet of the same number has normal leaves.

Vernonia jaliscana has been distributed as *V. serratuloides*, with which it is undoubtedly closely related, as shown by the character of the inflorescence, the shape and color of the involucre, the general habit of the plant, and its geographical distribution. It is amply distinguished by its broad, very scabrous leaves, its 21-flowered heads, and more attenuate involucral scales.

59. **Vernonia umbellifera** sp. nov.

Stem erect, suffrutescent, freely branched above and with numerous smaller branches from the lower axils, purplish-brown, striate, glabrous; cauline leaves thick, ascending, narrowly lanceolate, 5–8 cm. long, 1 cm. wide or less, tapering to an acute tip, narrowed or barely rounded at base, entire or remotely serrulate, revolute, glabrous above or scabrous near the margin, glabrous beneath, the midvein very prominent, the lateral veins obscure; petioles 3–5 mm. long; axile leaves resembling the cauline but reduced in size; bracteal leaves sessile, sharply acuminate, 1.5 cm. long or less, or the uppermost subulate; inflorescence pyramidal; heads 8–11-flowered, aggregated in subumbellate clusters on peduncles 3–10 mm. long, or rarely sessile; involucre narrowly campanulate, 8 mm. high; scales all erect, appressed, glabrous or sparsely arachnoid, the exposed portion purple, the inner oblong, acute or abruptly acuminate, the outer shorter, lanceolate; achenes glandular, 2 mm. long, obscurely ribbed; pappus pale-tawny, 6–7 mm. long, the outer series indistinct.

Type: *Pringle 2316*, from the plains of Guadalajara, state of Jalisco; in the herbarium of Columbia University. A second sheet, *Pringle 2132*, from the same locality, is also referred here.

In general habit the species closely resembles *V. serratuloides*, but is distinguished by its narrow, glabrous, revolute, obscurely reticulated leaves.

60. Vernonia serratuloides H.B.K. Nov. Gen. **4**: 33. 1818

Perezia paniculata A. Gray, Proc. Am. Acad. **21**: 393. 1886.

Stems glabrous or puberulent, branching above; leaves narrowly oblong, 7–10 cm. long, 1.5–3 cm. wide, irregularly serrate, truncate to rounded or rarely narrowed at the base, scabrous above, pubescent or puberulent and strongly reticulate beneath; scales abruptly acuminate and cuspidate, purple usually only near the tip.

Type locality: "Valladolid de Mechoacan," Mexico.

Distribution: southwestern Chihuahua, *Palmer 279*, to Jalisco.

61. Vernonia oaxacana Sch.-Bip. in Klatt, Leopoldina **20**: 74. 1884

Shrubby, the stems prominently striate, thinly pubescent; leaves elliptic-oblong, 10 cm. long, 3 cm. wide, acute, entire or remotely denticulate narrowed at the base, scabrellate above, floccose beneath; petioles 5–12 mm. long; upper leaves smaller; inflorescence hemispheric; heads crowded, all peduncled; involucre campanulate, 5 mm. high; scales ovate-lanceolate to narrowly oblong, glabrous, acute, cuspidate.

Type locality: "S. Carlos," Mexico.

Distribution: Oaxaca and Chiapas, *Seler 1956*.

62. **Vernonia capreaefolia** (Sch.-Bip.) sp. nov.

Vernonia Ehrenbergiana capreaefolia Sch.-Bip. *ined.*

Stem erect, at least 1 m. high, suffrutescent, terete, striate, scabrous-puberulent or glabrate, simple to the inflorescence; leaves firm, broadly elliptic, 9–13 cm. long, 2.5–5 cm. broad, regularly tapering to an acute tip, coarsely serrate, narrowed or somewhat cuneate at base, very scabrous and dark-green above, paler and nearly glabrous beneath except for scabrous pubescence along the prominently reticulated veins; petioles 2–10 mm. long; upper and axile leaves similar but smaller; bracteal leaves 1 cm. long or less; inflorescence broadly pyramidal, 1–2 dm. wide, its branches puberulent; heads about 11-flowered, on short peduncles; involucre campanulate, 5 mm. high; scales loosely but regularly imbricated, glabrous or nearly so on the back, minutely ciliate, the outer lanceolate, acuminate and cuspidate, the inner ovate-oblong to narrowly oblong, acute, or subacute and mucronulate; achenes 2.5 mm. long, sharply ribbed, sparsely pubescent on the angles and glandular in the furrows; pappus nearly white, 5 mm. long.

Type: *Schaffner 117*, from Orizaba, Mexico; in the Gray Herbarium. Other sheets are *Nelson 1979*, from Oaxaca, *Nelson 4067* and *Pringle 2943*, from Jalisco. It is distinguished from *V. liatroides* by the larger, regularly elliptic, more prominently reticulated leaves with a different type of pubescence. The sheet selected for the type has but a few heads and leaves proportionately broader than those of the other specimens, but is labeled in Schultz's handwriting with the varietal name cited above.

63. Vernonia liatroides DC. Prodr. **5**: 34. 1836

Eupatorium tulanum Klatt, Abh. Naturf. Ges. Halle **15**: 324. 1882.

Herbaceous or suffrutescent, erect; stem striate, puberulent; leaves firm, elliptic-oblong or oblong-oblanceolate, 5–8 cm. long, 1.5–2 cm. wide, acute or short-acuminate, acute or cuneate at base, sharply serrate, especially toward the tip, scabrellate above, ferruginous-puberulent below, sessile or with petioles 1–2 mm. long; bracteal leaves similar but much smaller; inflorescence depressed-hemispheric, of rounded subumbellate cymes; heads about 11-flowered, in clusters of 2 or 3 on peduncles 3–5 mm. long; involucre campanulate, 3–4 mm. high; scales lanceolate or the inner oblong-lanceolate, glabrous or nearly so, regularly tapering to an acute, cuspidate, purple tip; achenes ribbed, prominently glandular in the furrows, 1.5–2 mm. long; pappus flavescent, 4 mm. long, the outer series distinct but short.

Type locality: "in Mexico inter Tula et Tampico."

Distribution: Tula to Tampico, *Berlandier 2139;* San Luis Potosi to Tampico, *Palmer 1081;* Orizaba, *Botteri 493;* western Mexico, *Seemann*. The last cited specimen has peculiarly narrow leaves, pubescent beneath.

64. Vernonia Sinclairi Benth. Bot. Voy. Sulph. 109. 1845

Vernonia Ehrenbergiana Sch.-Bip. Linnaea **20**: 513. 1847.

Stems herbaceous, erect, 1–2.5 m. high, cinereous-pubescent or glabrate with age; leaves elliptic or elliptic-oblong, 3–8 cm. long, 1.2–4 cm. wide, acute, serrate or nearly entire, scabrous above, cinereous-pubescent beneath; veins reticulated, the midvein prominent above; petioles 3–5 mm. long; bracteal leaves gradually reduced in size; inflorescence hemispheric or pyramidal; heads 8–11-flowered, on subulately bracted peduncles 2–5 mm. long; involucre campanulate, 4–5 mm. high; scales all appressed, purple-tipped, nearly glabrous on the back, the outer triangular-lanceolate, cuspidate, ciliate, the inner oblong-lanceolate, obtuse, cuspidate, entire;

achenes 2.5 mm. long, sharply ribbed when mature, glandular in the furrows; pappus nearly white, 4–5 mm. long, the outer series indistinct.

Type locality: "San Blas and Tepic."

Distribution: Oaxaca, *Smith 290;* Puebla, *Pringle 6246;* Orizaba, *Bourgeau 3339.*

VII. Lepidaploa, *Paniculatae verae*

Branches of the panicle irregularly branched, the internodes uneven in length; uppermost heads generally sessile or short-peduncled, the lower heads on more elongated peduncles, frequently surpassing the upper, the whole forming a crowded or lax, irregularly hemispheric or depressed panicle. Herbaceous, except in the first species-group.

By far the greater number of the North American paniculate species of *Lepidaploa* belong to this subsection, which extends from Central America through Mexico and the eastern United States. One species has also crossed into the Bahamas. A number of well-marked species-groups may be recognized, each characterized by certain morphological structures and by a definite geographical distribution. In the following account the species will be taken up by groups in order of their distribution, the Mexican first, then those of the southwestern United States, and lastly those of the Atlantic coast.

(i) Species-group *Alamanianae*

Heads large, many-flowered; involucral scales oblong, with parallel sides, mucronate or aristate, the outer reflexed or spreading. Two species of the mountains of lower Mexico.

65. Vernonia Alamani DC. Prodr. **5**: 61. 1836

Erect shrub, 1–2 m. high; leaves firm, dull-green, elliptic or elliptic-oblong, 9–14 cm. long, 3–7 cm. wide, broadest at the middle and tapering regularly to both ends, finely serrulate or subentire, puberulent or glabrate beneath; venation not prominently reticulate; involucre 15 mm. high, its scales triangularly acute or subrotund at the apex, with an awn 2 mm. long.

Type locality: Mexico.

Distribution: Morelos, Mexico, Oaxaca and Guanajuato, at altitudes of 1,800 to 2,200 meters.

66. **Vernonia dictyophlebia** sp. nov.

Shrubby, erect, 1–2 m. high; stem terete or obscurely striate, puberulent or thinly tomentose with brown or gray hairs; cauline leaves firm, spreading, ovate or ovate-elliptic, 6–10 cm. long, 3–6 cm. wide, broadest below the middle, tapering to an acute or subacuminate tip, obtuse to broadly rounded or subcordate at base, sharply irregularly serrulate, green and scabrous above, paler beneath and pubescent on the light-colored, very prominent, closely reticulated veins; petioles pubescent, 3–10 mm. long; upper and rameal leaves similar, but successively reduced to 1.5 cm. in length; inflorescence depressed-hemispheric, 1–2 dm. wide; heads 15–20 mm. wide, all on peduncles 2–4 cm. long with a few scarious bracts resembling the outer scales; involucre broadly campanulate, 12–15 mm. high; scales loosely but regularly imbricated in numerous series, glabrous, purple or purplish-green, with scarious margins, the outer spreading or reflexed, the inner narrowly oblong, obtuse to broadly rounded or retuse at the tip, minutely cuspidate or with the midnerve prolonged into an awn not over 1 mm. long; achene 4 mm. long, prominently ribbed, densely glandular in the furrows; pappus white, 8 mm. long.

Guanajuato, *Dugès;* Michoacan, *Pringle 3347*, *Holway 3105;* Oaxaca, *Gonzáles & Conzatti 867*. The type is *Pringle 3347*, in the herbarium of Columbia University.

Sharply distinguished from *V. Alamani* by the shape and pubescence of the leaves and by the shape of the involucral scales.

(ii) Species-group *Texanae*

Heads few, 21–many-flowered, all on ascending peduncles, forming a lax very irregular inflorescence; leaves ascending, broadest at or above the middle, scabrous above, glabrous or nearly so beneath. Four species of the Sonoran region in Mexico and the Texan region of the United States. The three Mexican forms occupy a continuous area, none of them occurring north of the Rio Grande. The single Texan species is geographically distinct from the others. It resembles *V. Ervendbergii* very closely and is to be regarded as a comparatively recent offshoot from that species. Once seen, the group is always recognized by its singularly loose irregular inflorescence.

67. Vernonia texana (A. Gray) Small, Fl. S. U. S. 1160. 1903

Vernonia angustifolia texana A. Gray, Syn. Fl. 1^2: 91. 1884.

Type locality: Texas.

Distribution: from central Arkansas south and southwest to the Gulf of Mexico.

As has been already mentioned the species is entirely distinct geographically and structurally from the southeastern *V. angustifolia* with which it was at first associated. A sheet in the herbarium of Columbia Universiiy, collected by J. Reverchon at Dallas, Texas, is somewhat abnormal. The leaves are lanceolate, widest near the base, proportionately broader and more sharply toothed than in the type; the corymb is small and compact and the involucral scales merely acute. It appears to be a xerophytic form.

68. Vernonia Ervendbergii A. Gray, Proc. Am. Acad. **17**: 203. 1882

Erect, 5–9 dm. high; stem angled, glabrous, branching above; leaves firm, lanceolate, oblong-lanceolate or narrowly elliptic, 5–10 cm. long, 1–3 cm. wide, acute or acuminate, narrowed to a sessile base, remotely serrulate, scabrellate above, glabrous beneath; inflorescence very loose and irregular; heads generally long-peduncled, 21–29-flowered; involucre broadly campanulate, or with age nearly hemispheric, 4–5 mm. high; scales all appressed, irregularly imbricated, glabrous or barely ciliate, lanceolate or oblong-lanceolate, acute or short-acuminate; achenes sharply ribbed, sparsely pubescent, 3.5 mm. long; pappus tawny, 5–6 mm. long, the outer series short, inconspicuous.

Type locality: Tantoyuca and Monclova, Mexico.

Distribution: northwestern Mexico, from Coahuila south to Vera Cruz.

The species is quite variable in foliage, extreme forms being represented by *Palmer 750* (cotype) with long narrow leaves approximating those of *V. texana*, and *Pringle 11606*, with elliptic, sharply and coarsely serrate leaves reaching 4 cm. in width.

69. Vernonia Schaffneri A. Gray, Proc. Am. Acad. **17**: 204. 1882

Erect, simple to the inflorescence, 3–5 dm. high; stem obscurely angled, glabrous below, pubescent above; leaves numerous, thin, bright-green, obovate, oblong, or broadly elliptic, 5–8 cm. long, 2–3.5 cm. wide, obtuse, tapering to a sessile base, entire or serrulate toward the tip, scabrellate above, glabrous or nearly so beneath; vein sprominent beneath, reticulated; upper leaves but little smaller; inflorescence loose, flattened, 1 dm. wide; heads 15 or less, all peduncled, about 40-flowered; involucre campanulate-hemispheric, 7–8 mm. high; scales purple, all regularly and closely imbricated, glabrous or minutely ciliate, the outer lanceolate, acute, the inner oblong-lanceolate, obtuse or subacute; achenes sparsely glandular-puberulent, 3 mm. long; pappus tawny, 6 mm. long.

Type locality: San Luis Potosi.
Distribution: San Luis Potosi and Hidalgo.

70. Vernonia Greggii A. Gray, Proc. Am. Acad. 17: 204. 1882

Vernonia Greggii Palmeri A. Gray *l. c.*

Erect, simple to the inflorescence; stem strongly striate, puberulent or glabrate; leaves firm, oblong-lanceolate, 8–10 cm. long, 1.5–2.5 cm. wide, broadest at the middle and tapering regularly to both ends, acute, serrulate, scabrous above, nearly glabrous beneath, with a prominent midvein, sessile or very short-petioled; upper leaves gradually smaller; heads large, many-flowered, on subulately bracted peduncles; involucre hemispheric or broadly campanulate, 8–10 mm. high; scales oblong-lanceolate or lanceolate, acuminate, glabrous; achenes 5 mm. long, sparsely puberulent, sharply ribbed; pappus tawny, 7 mm. long.

Type locality: "Northern Mexico."

Distribution: Coahuila, *Pringle 2850*, *Palmer 753*.

(iii) Species-group *Crinitae*

Heads very large, many-flowered, relatively few in number; scales narrowly acuminate or filiform; leaves linear or narrowly lanceolate. One Sonoran species in northwestern Mexico and an Ozarkian species in the United States.

71. Vernonia Bolleana Sch.-Bip. Bot. Voy. Herald, 297. 1856

Stem nearly terete, floccose, simple; leaves numerous, thick, narrowly linear, 6–8 cm. long, 3 mm. wide, glabrous and dark green above, lanate beneath, one-nerved, the margin revolute; heads few, many-flowered, on peduncles 4–6 cm. long; involucre turbinate-campanulate, 15 mm. high; scales imbricated in several series, straight, erect, linear to linear-oblong, acuminate, densely arachnoid near the base, glabrate or resinous towards the tip; immature achenes densely canescent, obtusely ribbed; pappus nearly white, 8 mm. long, the outer series distinct.

Type locality and distribution: Sierra Madre, Mexico.

The single specimen examined is in the Gray Herbarium, collected by Seemann in northwestern Mexico, and probably a cotype or fragment of the original. It is about 4 dm. high, and bears three heads.

72. VERNONIA CRINITA Raf. New Fl. N. Am. 4: 77. 1836

Vernonia arkansana DC. Prodr. 7: 264. 1838.

Stem erect, simple or sparingly branched, leafy, glabrous and somewhat glaucous, or minutely puberulent, striate, 1–3 m. high; leaves numerous, narrowly lanceolate or broadly linear, 8–15 cm. long, 0.5–2 cm. wide, acuminate, tapering at the base, entire or with minute scattered callous teeth, glabrous or sparingly pubescent; inflorescence irregular, with 5–40 heads; peduncles stout, thickened above, frequently pubescent; heads 55–89-flowered; involucre hemispheric, 12–20 mm. wide; scales glabrous or somewhat pubescent, lanceolate or ovate at the appressed base, acuminate into long flexuous tips about equaling the pappus; achenes strongly ribbed, glabrous or nearly so, 5–6 mm. long; pappus dull-purple, 6–7 mm. long.

Type locality: "In Louisiana and Arkanzas."

Distribution: Missouri, Kansas, Arkansas and Indian Territory.

Specimens agreeing with this description are very numerous in herbaria and correspond most closely with Rafinesque's original description. The species is very variable in the length and pubescence of the involucral scales, the pubescence and serration of the leaves and the general habit. Forms occur apparently intermediate with other species and have been regarded as hybrids, but since all evidence is lacking as to their origin or stability, they can at present be mentioned merely as intermediate forms, leaving their final disposal to future investigation.

1. *V. crinita-missurica.* Leaves narrow, minutely but sharply serrate, tomentulose-pubescent on the veins beneath; heads smaller than in the type; tips of scales much shorter than the pappus and little exceeding the involucral cup. Specimens with this habit have been collected at St. Louis, *Eggert*, Aug. 10, 1886, and De Soto, Missouri, *Hasse*, July 7, 1887.

2. *V. crinita-interior Baldwini.* Leaves as in the type, but more pubescent, involucre 8–9 mm. high, the scales acuminate, short, recurved. Missouri, *E. Hall.*

3. *V. crinita-interior.* Leaves as in the type, closely and finely tomentose beneath; scales long-acuminate but not filiform, all erect, equaling or a little shorter than the pappus; heads 10 mm. high. Choctaw Agency, Indian Territory, 1853–4, *Bigelow.* The plant might almost as well be connected with *V. marginata.*

(iv) Species-group *Lindheimerianae*

Leaves narrow, entire or sparingly serrate, tomentose or pubescent beneath; heads 21-flowered; scales all appressed, but irregularly imbricated, the exposed portion of the inner ones disproportionately longer than that of the middle or outer ones. Species all Texan.

73. Vernonia Lindheimeri A. Gray, Proc. Am. Acad. 1: 46. 1846

Type locality: "in rupestribus prope New Braunfels, Texas."

Distribution: East-central and southern Texas, from the vicinity of Dallas south and southwest to the Gulf of Mexico, and possibly extending west to New Mexico. The species prefers dry rocky hills and prairies.

V. Lindheimeri is a well-marked form of but little variability, and that mostly in the size of the plant and the number of heads in the inflorescence. One sheet, *Hayes 339*, has leaves white-tomentose on both sides, but that may be a juvenile condition.

74. Vernonia guadalupensis Heller, Muhlenbergia 1: 28. 1901.

Erect, 4–10 dm. high, simple to the inflorescence, the stem faintly striate, thinly covered with white pubescence or nearly glabrous; leaves numerous, crowded, thin or firm, usually somewhat scythe-shape, narrowly linear-lanceolate or linear, 8–15 cm. long, 0.5–1 cm. wide, entire or sparsely toothed, acute or acuminate, narrowed below, glabrous above, thinly pubescent beneath, the midvein prominent, yellowish; inflorescence corymbose, irregular, rather compact; heads all peduncled or rarely a few sessile, mostly 21-flowered, 12 mm. high at maturity; involucre campanulate, 6 mm. high; scales all appressed, irregularly imbricated, the inner much exceeding the outer, more or less thinly white-tomentose, ciliate or arachnoid, rounded or obtuse to acute or acuminate; achenes prominently ribbed, pubescent; pappus tawny to purple, the outer series conspicuous.

Type locality: Kerrville, Kerr County, Texas.

Distribution: central Texas.

The specimens cited above agree throughout in the one character of irregularly imbricated bracts, but otherwise they show a wide range of variability. The leaves are sometimes straight (*Stanfield*) and the variation in leaf-pubescence and involucral scales is very wide.

The specific nature of *V. guadalupensis* is indeed doubtful.

Early collections by Reverchon refer to it as a hybrid between *V. Lindheimeri* and *V. noveboracensis*. Later Gray spoke of it as an apparent hybrid between *V. Lindheimeri* and *V. Baldwini*; and more recently it has been regarded as a hybrid with *V. interior*. In the original description Heller states that it occurs with the two supposed parent species. Its close relationship with *V. Lindheimeri* cannot be doubted from morphological evidence; its hybrid nature must be determined experimentally.

75. **Vernonia Reverchonii** sp. nov.

Erect, 5 dm. high; stem glabrous or sparingly pubescent at the middle, simple to the inflorescence; leaves numerous, firm, spreading, narrowly oblong-lanceolate, 5–8 cm. long, 4–7 mm. wide, acute and mucronate, narrowed below, entire and slightly revolute, minutely scabrous above, thinly short-pubescent beneath, one-nerved with faint lateral veinlets; inflorescence flattened, compact, 7 cm. wide, with about 25 sessile or peduncled 21-flowered heads; involucre broadly campanulate or hemispheric, 6 mm. high; scales erect, appressed, oblong, rounded and mucronate at the tip, tomentose on the back except for a glabrous marginal line, densely arachnoid-ciliate, the exposed portion of the inner somewhat exceeding that of the outer; immature achenes puberulent; pappus purple-tawny, the outer series conspicuous.

Type: *Reverchon 402*, from Seymour, Texas; in the herbarium of the Missouri Botanical Garden.

The relationship of *V. Reverchonii* and *V. Lindheimeri* is shown by the general character of the involucre, although otherwise it is not far from *V. tenuifolia* or *V. marginata*. Regarded as the latter species by its original collector it may possibly be a hybrid between *V. Lindheimeri* and either of the two others. In any case it is parallel with *V. guadalupensis* and like it had best be regarded as a distinct species until conclusive evidence is at hand proving it of hybrid origin.

(v) Species-group *Fasciculatae*

Leaves normally narrow, glabrous or nearly so on both sides, and usually deeply pitted below; inflorescence flattened, compact; heads about 21-flowered, fewer in *V. Lettermanni*, more numerous in *V. illinoensis*. The latter species may be regarded as an aberrant xerophytic type of the group, having broad leaves which are tomentose below, and heads with 34 or more flowers. It is included under the Fasciculatae mainly on account of its distribution, although there

is also some morphological ground, as given under the description of the species. The Fasciculatae range from Texas northward through the Prairie province and follow its eastern extension to Ontario. With the exception of *V. fasciculata* and *V. illinoensis* the ranges of the different species overlap but little or not at all. *V. Lettermanni* is found only beyond the limits of the Prairie province in the Ozark region.

76. VERNONIA TENUIFOLIA Small, Bull. Torrey Club **25**: 145. 1898

Type locality: "in dry soil, western Texas."

Distribution: western and southwestern Texas and adjacent New Mexico, mainly south of, but overlapping, the range of *V. marginata*.

77. VERNONIA MARGINATA (Torr.) Raf. Atl. Jour. **1**: 146. 1832

Vernonia altissima marginata Torr. Ann. Lyc. Nat. Hist. **2**: 210. 1827.

Vernonia Jamesii Torr. & Gray, Fl. N. Am. **2**: 58. 1841.

Type locality: "On the Arkansa?"

Distribution: extreme southwestern Kansas, western Oklahoma, northwestern Texas and eastern New Mexico.

78. VERNONIA LETTERMANNI Engelm. Proc. Am. Acad. **16**: 78. 1880

Type locality: "Arkansas, on Cooper's Creek, Dr. J. M. Bigelow, and on sand-bars of the Washita, Lettermann."

Distribution: on sand-bars and gravel-beds, in the lower Ozark region of central Arkansas and Indian Territory.

79. VERNONIA CORYMBOSA Schw. Long's Sec. Exp. **2**: 394. 1824

Vernonia Schweinitzii Steud. Nomencl. Bot. ed. 2. **2**: 755. 1841.

Stem erect, glabrous, usually red, 4–8 dm. high; leaves firm, pale-green, erect or ascending, sessile, ovate-lanceolate, 4–7 cm. long, 1–2.5 cm. broad, acute, regularly serrate with low teeth, somewhat scabrous above, especially near the margin, glabrous and deeply pitted below, pinnately veined; inflorescence hemispheric, very dense, 5 cm. across; heads sessile or short-peduncled, 10–12 mm. high at maturity, 21-flowered; involucre broadly campanulate or

hemispheric, 8 mm. high; scales purple, appressed, ovate-oblong, glabrous or sparsely ciliate, rounded to obtuse or subacute; achenes 3.5 mm. long, nearly glabrous; pappus purplish, 6–7 mm. long, the outer series inconspicuous.

Type locality: "Northwestern Territory."

Distribution: in wet ground, from Eastern North Dakota to western Nebraska. North Dakota: Valley City, *Miss L. L. Perrine;* Devil's Lake, *Geyer 268;* Leeds, *Lunell;* upper Missouri River, *Rothkammer 491.* Nebraska: Big Spring, *Rydberg 135;* Fort Kearney, *Herb. Engelmann;* Platte River, *Fremont.*

Hesitatingly regarded as distinct by Schweinitz, the species has since been included with *V. fasciculata*, from which it is distinguished by the wide, merely acute leaves and the broader involucre. In geographical distribution it is also distinct, its range lying to the north and northwest of that of *V. fasciculata.*

80. Vernonia fasciculata Michx. Fl. Bor. Am. **2**: 94. 1803.

Stem erect, striate, glabrous, purple or greenish-purple, 6–10 dm. high; leaves numerous, ascending, thin, bright-green, linear, long-acuminate, narrowed to a sessile base, sharply dentate with curved ascending teeth, glabrous on both sides, 1-nerved with faint lateral veinlets, 8–13 cm. long, 4–7 mm. wide; inflorescence dense, hemispheric, 4–6 cm. across; heads crowded, sessile or short-peduncled, 21-flowered; involucre campanulate, 6 mm. high; scales all appressed and regularly imbricated, acute, glabrous, or sparingly ciliate, the exposed portion red or purple; achenes puberulent in the furrows, 3 mm. long; pappus purple.

Type locality: "in pratis illinoensibus."

The form chosen for description is abundant in open places in grassy swamps and in wet grounds throughout Illinois, and agrees most nearly with Michaux's character "foliis longo-linearibus." The species as at present understood is widely variable, and some or all of the three additional forms recognizable in herbarium material may eventually prove distinct. Still, they appear to intergrade, and in one case at least the ecological habit is different from the normal. The evidence at hand is not sufficient to warrant discussion of their systematic rank, and they will merely be described as forms which the species may assume. As examples of the type may be taken three sheets in the herbarium of the New York Botanical Garden, all from Illinois: Chicago, *Moffatt;* Oquawka, *Patterson;* and Chicago, *Babcock.*

2. Leaves broader, the width about one-sixth of the length, incon-

spicuously serrate, puberulent beneath; inflorescence pubescent; involucre campanulate-cylindric, 8 mm. high; scales obtuse or mucronate, ciliate. Abundant in swamps in central Illinois; Champaign, *Gleason 2843*.

3. Foliage glabrous; leaves ample, 8–15 cm. long, 1.5–2.7 cm. wide, sharply and saliently dentate, the lateral veinlets prominent; inflorescence large, open, irregular; heads numerous; involucre as in the type; scales in few series, sharply acute or short-acuminate, ciliate. *Pammel 32*, from Clinton, Iowa, is an example of the form, to which, in fact, most of the herbarium material examined belongs.

4. Leaves broader, ovate-lanceolate, 3–5 cm. in width, sharply serrate, reticulately veined, sparsely puberulent beneath; inflorescence loose, irregular; involucre 8 mm. high, campanulate; scales closely imbricated, acute, puberulent on the back. In dry ground, central Illinois: Urbana, *Gleason 2880*.

Distribution: From western Ohio west to southeastern Minnesota and eastern Nebraska, thence south into Indian Territory.

81. **Vernonia illinoensis** sp. nov.

Erect, simple or branching above, 10–15 dm. tall; stem usually purple, finely tomentose or pubescent; leaves spreading, firm, lanceolate or ovate-lanceolate, 6–15 cm. long, 1.5–4 cm. wide, long-acuminate, sharply and irregularly serrate, narrowed to a sessile base or short-petioled, dark-green and more or less scabrous above, paler and tomentose, or pubescent with ferruginous hairs beneath; inflorescence flattened or concave, 1–5 dm. across; peduncles tomentose; heads sessile and short-peduncled, 34–55-flowered; involucre broadly campanulate or hemispheric, 6 mm. high or rarely larger; scales all closely appressed, regularly imbricated, ovate to ovate-oblong, rounded, obtuse or rarely subacute at the tip, frequently mucronate, slightly pubescent or glabrous on the back, arachnoid-ciliate, the exposed portion purple; achenes furrowed, nearly glabrous, 4 mm. long; pappus purple or rarely tawny, 6–8 mm. long, the outer series frequently lighter in color.

Type: *Gleason 2865*, from Champaign, Illinois; in the herbarium of the New York Botanical Garden.

Distribution: Iowa, Illinois, Indiana, Michigan, Ontario and Ohio, following the eastern arm of the Prairie province.

Morphologically *V. illinoensis* stands very close to *V. missurica*, and extreme forms resemble that species so closely that they can not be distinguished from it by morphological structure alone.

On the other hand the typical form, extremely abundant on the prairies of central Illinois, is easily recognized from *V. missurica* by the smaller heads, the less tomentose leaves, the shorter involucre, the blunter, more arachnoid scales, and the purple pappus. The evidence from the geographical distribution of the two is alone sufficient to warrant the separation of the species. *V. missurica* is typically an Ozarkian plant, and no members of the Ozarkian flora have a range even approaching that of *V. illinoensis*. The latter is characteristic of the eastern arm of the Prairie province. Its distribution is therefore similar to that of *V. fasciculata*, and since it also somewhat resembles that species in the color of the scales and pappus, the sharper serration and the relatively little pubescence of the leaves, it seems probable that its affinities are with the group Fasciculatae rather than with the Interiores.

Specimens from Ontario have been distributed with the herbarium name *V. Macounii* Britton. They represent an extreme form with rather rugose, thinly pubescent leaves, and with reduced inflorescence, and should not be taken as a specific type, unless the form is eventually regarded as distinct from the western psilophyte.

(vi) Species-group *Interiores*

Heads large, 18–55-flowered; involucral scales appressed, at least at the base, spreading or recurved at the apex, usually acute or acuminate, more or less pubescent; pappus tawny or purple-tawny; leaves broad, serrate, tomentose beneath. The two species are characteristic of the Ozark region, and extend but little beyond its limits north into Iowa and south into Texas.

82. Vernonia interior Small, Bull. Torrey Club **27**: 279. 1900

Involucral scales greenish-purple, lanceolate, acute or short-acuminate, thinly canescent and ciliate, regularly imbricated, appressed at the base, the tips erect or very slightly spreading.

Type locality: "On plains and prairies, Missouri and Kansas south to Texas."

Distribution: from southeastern Nebraska and southern Iowa south to central Texas.

A well-marked species of little variability, except in the involucral scales. One sheet in the National Herbarium, *Crevecoeur 30*, from Onaga, Kansas, has few heads in a dense corymb, with

the narrow, long-acuminate, sharply serrate leaves of *V. fasciculata*, and may be a hybrid between the two species.

VERNONIA INTERIOR BALDWINI (Torr.) Mack. & Bush, Man. Fl. Jackson County 190. 1902

Vernonia Baldwini Torr. Ann. Lyc. Nat. Hist. **2**: 211. 1827.
Vernonia sphaeroidea Nutt. Trans. Am. Phil. Soc. **7**: 283. 1840.

Resembling the type, but with usually shorter involucre, more pubescent scales which are recurved at the tip, and frequently with shorter, proportionately broader leaves.

In dry soil, Missouri and southwestern Illinois, intergrading with the species.

83. VERNONIA MISSURICA Raf. Herb. Raf. 28. 1833

Vernonia fasciculata β T. & G. Fl. N. Am. **2**: 58. 1841.
Vernonia altissima grandiflora A. Gray, Syn. Fl. **1**[2]: 90. 1884.
Vernonia Drummondii Werner, Jour. Cin. Soc. Nat. Hist. **16**: 171. 1894.
Vernonia interior Drummondii Mack. & Bush, Man. Fl. Jackson County 190. 1902.

Erect, 10–15 dm. high, branching above; stem stout, angled, gray-tomentose; leaves numerous, thick, spreading, sessile or short-petioled, lanceolate or ovate-lanceolate, 10–15 cm. long, 2–5 cm. wide, long-acuminate, sharply and coarsely serrate, acute or rounded at the base, scabrous above, tomentose beneath; inflorescence flattened, 2–5 dm. across; peduncles densely tomentose; heads sessile or short-peduncled, 34–55-flowered; involucre broadly campanulate or short-cylindric, 7–8 mm. high; scales regularly and closely imbricated, all appressed or rarely somewhat spreading, ovate or ovate-lanceolate, purple or greenish, rounded, obtuse, acute or mucronate, glabrous or puberulent on the back, more or less arachnoid-ciliate; achenes 4.5 mm. long, sharply ribbed, puberulent in the furrows; pappus 6–8 mm. long, tawny or rarely with a purple tinge, the outer series short but distinct.

Type locality: "In Missouri, barrens."

Distribution: Illinois, Missouri, Kansas, Arkansas, Indian Territory, and Texas, on prairies, barrens, and dry ground.

The species varies greatly in the shape of the involucral scales as well as in the color of the pappus, and extreme forms can scarcely be distinguished from *V. illinoensis*, except by the collection locality. *V. missurica* is typically an Ozarkian plant, and Tracy's *7334* from

southern Texas is the only sheet examined from far beyond the Ozarkian center.

(vii) Species-group *Altissimae*

Leaves lanceolate to ovate; inflorescence loose; heads 18–29-flowered; involucre rounded at base; scales closely and regularly imbricated. Three species of the Mississippi valley and the lower Appalachian mountains, extending south to the Gulf coast.

84. VERNONIA OVALIFOLIA T. & G. Fl. N. Am. 2: 59. 1841

Vernonia noveboracensis latifolia A. Gray, Syn. Fl. 1²: 89, partly. 1884.

Erect, 8–12 dm. high; stem glabrous or puberulent, simple or with a few branches below the inflorescence; leaves elliptic-oblong to lance-ovate, 8–10 cm. long, 2–5 cm. wide, acute or very short-acuminate, acute to obtuse or rounded at base, short-petioled, coarsely serrate, especially along the upper two-thirds, smooth or scabrous above, glabrous, pale and glaucescent, or a little puberulent on the veins beneath; upper leaves smaller, lanceolate or narrowly elliptic; inflorescence flattened, loose; heads sessile or short-peduncled, 18–21-flowered; involucre broadly campanulate, 5–6 mm. high; scales ovate or lance-ovate, ciliate, appressed at base, somewhat spreading at the short-acuminate cuspidate tips; achenes strongly furrowed, short-hirsute on the ribs, 3 mm. long; pappus tawny or rarely purplish, 6 mm. long, the outer series short but conspicuous.

Type locality: "Middle Florida, *Dr. Chapman!* also near Fort King, *Mr. Alden!*"

Distribution: from central Alabama through southern Georgia and into Florida.

Vernonia ovalifolia is another variable species, exhibiting marked differences in the foliage without affording any valid characters for separation of species. The preceding description is based on the type specimen from middle Florida and the following others: West Florida, *Chapman;* middle Florida, *Chapman 273;* Quincy, Florida, *Chapman;* Appalachicola, Florida, *Chapman;* Alabama, *McCarthy.* Harper's *1737*, from Cuthbert, Georgia, is also referred here, but differs slightly in the larger coarser leaves with less evident serrations. In addition the following forms require special mention:

2. Stem 4–6 dm. high; leaves small, lanceolate, 7 cm. long, 1.5 cm. wide, scabrous above, narrowed at base, with low sharp distant denticulations; inflorescence only 5–8 cm. across. The leaves are

not unlike the narrow upper leaves of the typical form. Auburn, Alabama, *Earle & Baker 769, 770.*

3. Leaves very broadly elliptic or ovate, narrowed below, sharply and coarsely serrate throughout, 8–9 cm. long, 4–5 cm. wide; the inner scales of the involucre often nearly acute. Auburn, Alabama, *Earle; Earle & Baker 1418.*

4. Leaves narrowly elliptic, acuminate, narrowed at base, sharply serrate with low teeth, scabrous above, more or less pubescent below, especially on the veins, 8–10 cm. long, 2–3 cm. wide; inflorescence large, very lax and irregular. Lee county, Georgia, *Harper 1075;* Auburn, Alabama, *Earle & Baker 774, 765; Earle 99; Pollard & Maxon 1.*

Inasmuch as *V. ovalifolia* is clearly related to *V. altissima* and to *V. flaccidifolia*, the typical form of the species, as here defined, is not that represented by the nomenclatorial type from Florida, but rather the fourth form described, growing in eastern Alabama and western Georgia.

85. Vernonia flaccidifolia Small, Bull. Torrey Club **25**: 144. 1898

Erect, 8–15 dm. high; stem glabrous; leaves lanceolate to ovate, 12–20 cm. long, 3–6 cm. wide, or rarely more narrowly lanceolate, acuminate, narrowed at the base into a margined petiole, sharply and saliently serrate, essentially glabrous on both sides; inflorescence flattened, loose, 1–3 dm. wide; heads about 21-flowered; involucre hemispheric, 3.5–4 mm. high; scales all appressed, regularly imbricated, glabrous, oblong-ovate, greenish or with a purple spot at the obtuse or subacute tip; pappus tawny, 6 mm. long.

Type locality: "On wooded hillsides, Ringgold, Georgia."

Distribution: the lower Appalachian region of Tennessee, South Carolina, Georgia and Alabama.

Related on the one side to *V. ovalifolia* and on the other to *V. altissima*, *V. flaccidifolia* is distinguished from either by its short, hemispheric involucre with glabrous, purple-tipped scales. It is without doubt the most definitely characterized species of the southeastern states, and is just as distinct from related forms as is *V. Lindheimeri* of the southwest.

86. Vernonia altissima Nutt. Gen. **2**: 134. 1818

Vernonia albiflora Raf. Herb. Raf. 29. 1833.

Vernonia gigantea Britton, Bull. Torrey Club **20**: 485, in part. 1893.

Vernonia maxima Small, Bull. Torrey Club **27**: 280. 1900.
Vernonia gigantea pubescens Morris, Proc. Biol. Soc. Washington **13**: 179. 1900.

Erect, 10–30 dm. high, frequently branched above; stem glabrous or nearly so; leaves narrowly elliptic, lanceolate or lance-ovate, 15–25 cm. long, 3–7 cm. wide, long-acuminate, attenuate at base, sharply and irregularly serrate or rarely nearly entire, glabrous or scabrellate above, glabrous or puberulent beneath; inflorescence flattened or concave, loose, 2–5 dm. across; heads 21–29-flowered; involucre campanulate, 4–5 mm. high; scales all appressed, regularly imbricated, ovate or oblong-ovate, sparingly ciliate, acute to obtuse or short-cuspidate at the tip; pappus purplish, 5–7 mm. long.

Type locality: "Near Savannah in Georgia, and throughout the States of Ohio and Kentucky, on the margins of streams and swamps."

Distribution: from western Pennsylvania to Missouri, south to Louisiana and Mississippi.

As might be expected in a species having such a wide distribution, there is considerable variation in the character and amount of foliage. One sheet from Missouri, *Mackenzie 93*, has firm leaves with the serration reduced and a tawny pappus. Some have leaves with salient teeth and smaller involucres, approaching *V. flaccidifolia*. One of these, *Tracy 8537*, has heads with as few as 15 flowers. A specimen from Westfield, Mississippi, has linear or narrowly lanceolate upper leaves which are nearly or quite entire. *Bush 1906* has smaller leaves, sparingly serrate with low teeth, broadest above the middle, scarcely acuminate, and a smaller inflorescence with dull-purple pappus.

The choice of the oldest valid name for the species is attended with some difficulty, and the introduction of an old name displaced in recent publications calls for an explanation. The solution of the question rests entirely on the identity of the *Vernonia altissima* of Nuttall. Until recent years this name has covered two species, the one here described and *V. gigantea* Britton. In the publication of the latter name Britton did not attempt to separate the two forms, but merely substituted Walter's old name, and indeed the particular collection which led to this nomenclatorial change was *V. altissima*. Gray was apparently the first to recognize two forms under the aggregate, when he mentioned in the Synoptical Flora the form *parviflora* "with involucre only 2 or 3 lines high

and rather pauciseriate." But Gray evidently did not consider those differences as of taxonomic importance. He further added that this form is Nuttall's original, and on that basis Small kept the name *altissima* as a synonym for *gigantea* and described the inland plant as *V. maxima*.

The essential difference between the two forms lies in the involucre, which in *V. gigantea* is less than half the height of the mature heads, subturbinate in shape, narrowed at the base, and with loosely imbricated, irregular scales. In the species under discussion it is at least half the height of the heads, broadly campanulate or nearly hemispheric in shape, rounded at the base, and with closely and regularly imbricated scales. Nuttall's original description of *V. altissima* agrees perfectly with the latter, "calix small and hemispherical, scales appressed, ovate, acute, ciliate, awnless," and "inner scales of the calix obtuse, without points, external merely acute, and with the points appressed." Elliott redescribed the plant and spoke also of the compact hemispheric involucre with closely appressed scales. It seems clear that Nuttall could have had no other plant in mind when formulating his description. There is nothing to indicate that the specimen referred to by Gray as Nuttall's original was taken by him as a type. In his description are the words "v. s. Anonymous, in Herb. Muhl." but the characters given must have been drawn instead from his field observations, and the Muhlenberg specimen was merely incorrectly referred to the same species.

The publication of a species by an intelligible description is just as valid as publication with reference to an earlier name, and if the accidental or incorrect citation of specimens is to take precedence over either then the name of this species would become *V. gigantea*, because that binomial was first applied to Kearney's *188* from Kentucky, or *V. albiflora* Raf., based on a white-flowered form.

(viii) Species-group *Giganteae*

Inflorescence usually very large and loose; heads 8–13-flowered; involucre short, narrowed at the base, and less than half the height of the mature head; scales loosely and irregularly imbricated, very variable in length. One species of the coastal plain of the South Atlantic states.

87. Vernonia gigantea (Walt.) Britton, Bull. Torrey Club **20**: 485. 1893

Chrysocoma gigantea Walt. Fl. Car. 196. 1788.

Vernonia altissima Lessing, Linnaea **6**: 639, partly. 1831. Not *V. altissima* Nutt.

Vernonia altissima parviflora A. Gray, Syn. Fl. **1**^{2} : 90. 1884.

Vernonia oligantha Greene, Pittonia **5**: 56. 1902.

Erect, branching above, with angled glabrous stems reaching a height of 2 m.; leaves scattered, lanceolate to elliptic, 10–20 cm. long, 1–6 cm. wide, acuminate, narrowed at the base into a short petiole, sharply serrate to nearly entire, glabrous or scabrellate along the margin above, glabrous or puberulent beneath; inflorescence usually very large, 2–4 dm. across, loose, irregular; heads sessile or peduncled, 8–13-flowered; involucre obpyramidal, 3–4 mm. high, less than half as high as the mature heads; scales loosely and irregularly imbricated in few series, all erect, oblong or oblong-lanceolate, acute or obtuse, glabrous or ciliate; achenes puberulent in the furrows, 3 mm. long; pappus dull-purple, 6 mm. long, the outer series usually lighter in color.

Type locality: "Carolina."

Distribution: South Carolina, Georgia and Florida, in swamps and wet places along the coastal plain.

Vernonia oligantha Greene, based on Tracy's *7339*, from Palmetto, Florida, and represented also by collections of Keeler at Neptune and Alden at Fort King, is apparently only a depauperate or shade form, with smaller proportionately wider leaves, and smaller inflorescence with fewer heads. The involucre is in all respects like the type.

Some specimens with narrow nearly entire leaves, such as *Harper 1936* from Baker County, Georgia, appear very different from the normal form in habit.

(ix) Species-group *Glaucae*

Leaves broad, usually rather abruptly narrowed at the base; heads many-flowered; scales acuminate into short filiform tips; pappus straw-colored. One species in the lower Appalachian mountain region.

88. Vernonia glauca (L.) Willd. Sp. Pl. **3**: 1633. 1804

Serratula glauca L. Sp. Pl. 818. 1753.

Vernonia noveboracensis latifolia A. Gray, Syn. Fl. **1**^{2}: 89, in part. 1884.

Vernonia noveboracensis tomentosa Britton, Ill. Fl. 3: 302. 1898.

Stem erect, glabrous or nearly so, 10–16 dm. high; leaves narrowly ovate-lanceolate or elliptic-oblanceolate to almost ovate, 10–25 cm. long, 2–10 cm. wide, short-acuminate, sharply and saliently dentate, abruptly narrowed at the base into a short margined petiole, glabrous or scabrellate above, paler and thinly pubescent beneath; inflorescence loose, flattened, 1–3 dm. wide; heads 34–47-flowered; involucre broadly campanulate or hemispheric, 6–7 mm. high; scales closely imbricated, glabrous or puberulent, lanceolate or triangular-ovate at the appressed base, acuminate, some or all with a filiform tip 2–5 mm. long; achenes prominently ribbed, nearly glabrous, 3.5 mm. long; pappus tawny or straw-colored, 6–7 mm. long.

Type locality: "in Marilandia, Virginia, Carolina."

Distribution: from southeastern Pennsylvania to Georgia and Alabama.

The species is distinguished at once by the characteristic and constant structure of the involucre and color of the pappus. There is, however, great variation in the foliage. Some plants have narrowly elliptic-oblanceolate leaves 2 by 10 cm., others broadly ovate leaves 5 by 13 cm., or even 10 by 25 cm. Both types are found throughout the range of the species.

Vernonia glauca Britton (Mem. Torrey Club 5: 311. 1894) is identical with *V. glauca* Willd., but *V. glauca* Britton, as used in the Illustrated Flora, refers to an entirely different plant, if indeed to any one definite plant at all. The involucral scales in the latter, as described, are similar in shape to those of *V. altissima*, but that species very rarely has less than 20 flowers in each head. The leaves resemble those of *V. ovalifolia*, but here the scales are different. Some plants of *V. flaccidifolia* have been distributed under this name, but the range as given in the Illustrated Flora extends too far north for that species, which also has about 21 flowers in the head.

(x) Species-group *Noveboracenses*

Tall species with thick stems, ample foliage, lanceolate leaves and wide inflorescence; heads many-flowered; scales all acuminately narrowed into spreading or recurved tips; pappus purple or tawny-purple. The two species are distributed along the Atlantic coastal plain from Massachusetts to Mississippi and inland to the Allegheny mountains.

89. VERNONIA NOVEBORACENSIS (L.) Michx. Fl. Bor. Am. 2: 95. 1803

Serratula noveboracensis L. Sp. Pl. 818. 1753.
Serratula praealta L. *l. c.*
Vernonia praealta Michx. *l. c.*
Chrysocoma tomentosa Walt. Fl. Car. 196. 1788.
Vernonia tomentosa Ell. Sk. 2: 288. 1824.
Vernonia noveboracensis tomentosa Britton, Mem. Torrey Club 5: 311. 1894.

Stem erect, 10–20 dm. tall, glabrous or thinly pubescent; leaves lanceolate, 10–18 cm. long, 1.5–4 cm. wide, acuminate, narrowed below, sessile or short-petioled, sharply serrate to nearly entire, glabrous or scabrellate above, puberulent or thinly tomentose beneath, especially on the veinlets; inflorescence flattened, loose, 1–3 dm. wide; heads sessile or short-peduncled, 29–47- (usually 34-) flowered; involucre campanulate, 6–7 mm. high; scales regularly and closely imbricated, glabrous or sparingly ciliate, ovate, rather abruptly tapering to a long filiform tip; achenes nearly glabrous, 4–4.5 mm. long; pappus purple or rarely tawny-purple, 6–7 mm. long.

Type locality: "in Noveboraco, Virginia, Carolina, Canada, Kamtschatca."

Distribution: Massachusetts to West Virginia and Mississippi, mostly near the coast.

The number of synonyms under the species name indicates to some extent the uncertainty which has characterized the treatment of *Vernonia noveboracensis* during the past hundred years. There is scarcely one of the large species of the central, eastern, or western states that has not at some time been confused with it. The plate and careful description of Dillenius in the Hortus Elthamensis make it perfectly clear to what form the Linnaean name applies. But Linnaeus also recognized another of Dillenius' species, *Serratula praealta*, differing from the type only in the shorter appendages of the involucral scales. The identity of this plant was in doubt for many years, until finally in 1829 Lessing showed its similarity to *V. noveboracensis*.

Walter's *Chrysocoma tomentosa* has been still more puzzling. His meagre description "herbacea, caule tripedali, foliis alternis lanceolatis dentatis subtus tomentosis," shows no essential difference from *V. noveboracensis*. Elliott, in transferring the species to the genus *Vernonia*, gave a fuller account, describing a plant with nar-

rowly lanceolate, sharply serrate leaves, tomentose and hoary beneath, and with the scale-tips "twice as long as those of any other species I have seen." Again, there is nothing to distinguish it from *V. noveboracensis*. It is also worthy of note that Elliott was not at all certain of the identity of his plant with that described by Walter. After seventy years Britton reduced it to a variety, but, strangely enough, his description in the Illustrated Flora and in the Manual refers mainly to *V. glauca*. After describing *V. noveboracensis* with leaves 5″–12″ wide he says for the variety: "Leaves * * * broader; * * * some scales sometimes merely acute," both characters directly at variance with Elliott's description, and agreeing scarcely better with Walter's. More recently E. S. Steele* has discussed the matter, and regards the name *V. tomentosa* Ell. as belonging to a hydrophile form of the south Atlantic coast, with linear-lanceolate leaves, sparsely and finely serrate and gray-tomentose beneath. In his opinion it is a distinct species. My own examination of the two sheets in the National Herbarium to which Steele referred disclosed no differences sufficient to warrant its separation. Small's distinction of a straw-colored pappus in *V. tomentosa* is not supported by herbarium evidence. Two sheets so labeled in the Columbia herbarium have immature heads which had not flowered, and the third, with tawny pappus, is clearly *V. glauca*.

90. **Vernonia Harperi** sp. nov.

Stem stout, erect, angled or striate, puberulent, simple below, divaricately branched above, 1 m. tall or higher; leaves numerous, thin, spreading or ascending, lanceolate, 12–18 cm. long, 1.6–3 cm. wide, acuminate, narrowed below into short petioles, sharply dentate with low ascending teeth, scabrous above, especially near the margin, the lateral veinlets prominent; upper and bracteal leaves smaller; inflorescence very large, 3 dm. across, very lax, open, irregular; heads long-peduncled to nearly sessile, 13–14 mm. high at maturity, with 55 flowers or more; involucre broadly campanulate, 7–9 mm. high exclusive of the awns; scales green, closely and regularly imbricated, appressed at the triangular-ovate base, arachnoid-ciliate, gradually tapering into erect awns barely equaling the pappus; achenes minutely pubescent on the ribs, 3.5 mm. long; pappus dull-purple, 6 mm. long, the outer series indistinct.

Type: *Harper 1424;* in the herbarium of the New York Botanical Garden.

Distribution: Coffee County, Georgia, *Harper 723, 1424.*

* Proc. Biol. Soc. Washington **14**: 81–82. 1901.

Vernonia Harperi is distinguished from *V. noveboracensis* by the larger and looser inflorescence, the larger heads, the more numerous flowers, and by the greenish scales rather gradually narrowed at the tip.

(xi) Species-group *Pulchellae*

Leaves linear to broadly oblong, usually scabrous above; heads medium-sized, with 21 flowers or rarely more; scales acuminate or filiform. Coastal plain species of the southern Atlantic coast in the United States.

91. **Vernonia acaulis** (Walt.) nom. nov.

Chrysocoma acaulis Walt. Fl. Car. 196. 1788.
Vernonia oligophylla Michx. Fl. Bor. Am. **2**: 94. 1803.

Type locality: "in Carolina."

Distribution: North Carolina to Florida, in the coastal plain.

Michaux recognized two varieties, *verna* and *autumnalis*, based on minor details of the inflorescence of no taxonomic importance.

92. Vernonia pulchella Small, Bull. Torrey Club **25**: 145, 1898

Stem erect, simple to the inflorescence, leafy, pubescent, 4–7 dm. high; leaves oblong or oblong-lanceolate, 4–7 cm. long, 1–1.6 cm wide, acute, coarsely and irregularly toothed, rounded or subcordate at the sessile base, pinnately and reticulately veined, scabrous on both sides and with brown pubescence on the veins beneath; upper leaves narrower, acute at the base and nearly entire; inflorescence loose, depressed; heads peduncled or a few sessile, about 21-flowered; involucre campanulate, 5–7 mm. high; scales lanceolate, pubescent, loosely imbricated in few series, appressed below, acuminate into a recurved or spreading filiform tip; achenes 3 mm. long, strongly ribbed, hirsute on the angles; pappus tawny.

Type locality: "on sand-hills bordering the Altamaha River swamps in Liberty County, Georgia."

Distribution: South Carolina and Georgia.

93. **Vernonia recurva** sp. nov.

Stem erect, brown, pubescent below, glabrate above, striate, simple to the inflorescence, 7 dm. high; internodes short, about 1 cm. long below to 2 cm. above; leaves mostly near the base, firm, ascending, linear or oblong-linear, acute at the tip, rounded, closely sessile and somewhat dilated at base, revolute at the margin, with a few minute callous teeth, scabrous and puberulent above and be-

neath, pinnately veined with faint lateral veinlets; principal leaves 5–7 cm. long, 0.4–0.9 cm. wide, the upper leaves reduced to 2 cm. long, and 0.2 cm. wide, or those of the inflorescence still smaller; inflorescence terminal, open, loosely branching, 15 cm. across; heads about 20, all pedicelled, about 21-flowered, 11–12 mm. high at maturity; involucre 8 mm. high, campanulate-cylindric; scales dull-purple, the outer short, loose, linear, the intermediate and inner lanceolate and long-acuminate to oblong-lanceolate and abruptly acuminate, nearly glabrous, appressed at the base and ending in a loose, spreading or recurved, filiform appendage 3–6 mm. long; achenes strongly ribbed, minutely hispid on the angles, 3.5 mm. long; pappus twice as long, tawny, the outer series minute.

Type: *Harper 2009*, dry pine-barrens, Hortense, Wayne County, Georgia; in the herbarium of the New York Botanical Garden.

Vernonia recurva is distinguished from *V. scaberrima*, its nearest relative, by the narrower revolute leaves, the larger heads, the recurved scales, and the narrower involucre. From *V. pulchella* it is separated by the narrower leaves, which are merely denticulate and with the characteristically dilated base.

94. Vernonia scaberrima Nutt. Gen. **2**: 134. 1818

Vernonia brevifolia Raf. New Fl. N. Am. **4**: 77. 1836.
Vernonia angustifolia scaberrima A. Gray, Syn. Fl. 1^2: 91. 1884.

Erect, 3–6 dm. high, simple to the inflorescence or sparingly branched; stem glabrous or puberulent below, striate, leafy; leaves narrowly oblong, closely sessile, with a rounded to truncate or dilated base, acute or cuspidate, remotely denticulate, scabrous above, sparsely pubescent with scattered white hairs beneath, 2.5–7 cm. long, one fifth to one twelfth as wide; upper leaves gradually reduced; inflorescence loose, open, subumbellate; heads all pedunculed, 8–9 mm. high at maturity; involucre campanulate, 6–7 mm. high; scales all loosely imbricated, nearly glabrous or somewhat ciliate, lanceolate, long-acuminate into straight, erect or spreading tips; achenes hirsute, 2.5 mm. long; pappus tawny, about twice as long.

Type locality: "from South Carolina to Florida."

Distribution: North Carolina, South Carolina, Georgia and Florida.

(xii) Species-group *Angustifoliae*

Leaves usually linear or narrowly lanceolate and scabrous above; inflorescence regular, depressed or flattened; heads small, 13–21-flowered; scales acute to acuminate. Certain species disagree in

one or more of the preceding characters, but the general habit of the plants, coupled with their distribution, clearly indicates their relationship. All are coastal-plain species of the southern Atlantic coast of the United States, except one endemic in the Bahamas.

95. VERNONIA ANGUSTIFOLIA Michx. Fl. Bor. Am. **2**: 94. 1803

Chrysocoma graminifolia Walt. Fl. Car. 196. 1788.

Vernonia graminifolia Mohr, Contrib. U. S. Nat. Herb. **6**: 759. 1901.

Erect, 5–10 dm. high, simple to the inflorescence; stem striate, glabrous, pubescent or short-hirsute; leaves crowded, all narrowly linear, 5–10 cm. long, with revolute margins, scabrous above, sparingly pubescent beneath; inflorescence ample, rather compactly many-headed; involucre campanulate, 6 mm. high; scales glabrous or ciliate, lance-ovate, reddish or purple, appressed or the short-acuminate tips slightly spreading; achenes 2–3 mm. long, furrowed, pubescent; pappus purplish.

Type locality: "in aridis apricis sylvarum Carolinae."

Distribution: North Carolina, South Carolina, Georgia, Alabama, Florida, Mississippi.

There is considerable variation in foliage and involucre among the specimens examined. *Biltmore 3669*[a] has a narrowly cylindric involucre and tawny pappus, but is otherwise like the type. *Earle & Earle 98* from Auburn, Alabama, has the lower leaves flat, over a centimeter wide and saliently toothed. The upper leaves are linear and revolute. Others from the same place, like *Earle & Baker 1171*, have lanceolate or narrowly elliptic, entire leaves, sometimes 1 cm. across. They are a little revolute, and since the plant differs from the type in no other way it may be regarded as a mesophytic or shade form of the species.

Although the oldest specific name for the species is Walter's *graminifolia*, the use of the binomial *V. graminifolia* Mohr is antedated by *V. graminifolia* Gardner, applied in 1847 to a Brazilian species.

96. **Vernonia dissimilis** sp. nov.

Stem stout, thick, erect, 8–11 dm. high, strongly striate, glabrous above, pubescent or short-hirsute below; leaves numerous, firm, spreading or ascending, sessile, narrowly lanceolate, 10–15 cm. long, 1–2 cm. wide, acuminate at both ends, sharply serrate, not revolute, scabrous above, especially at the margins, sparsely pubescent with short white hairs beneath, pinnately veined with conspicuous lateral veinlets; upper leaves gradually reduced in size,

nearly entire; inflorescence terminal, flattened, rather dense; heads about 21-flowered, 8 mm. high at maturity, sessile or on pedicels seldom over 1.5 cm. long; involucre campanulate, 4 mm. high; scales closely imbricated in few series, all appressed, ovate-lanceolate, strongly arachnoid-ciliate, obtuse, subacute, or the outer sharply acute, exposed portions dark-red; achenes sharply and prominently ribbed, hirsute on the angles and somewhat resinous, 2.5 mm. long; pappus 5 mm. long, bright-purple, the outer series inconspicuous.

Type: *Earle & Baker 1189*, from Auburn, Alabama; in the herbarium of the New York Botanical Garden.

The species is closely related to *V. angustifolia*, from which it is distinguished by the taller and coarser habit, the broad, flat, serrate leaves, the proportionately smaller and more irregular corymb, the arachnoid involucre, the blunt scales and the more brightly colored pappus. In general habit and gross appearance, so far as can be shown by herbarium sheets, the two are entirely distinct. It is to be regretted that no notes are available on its ecology, since both species live together in the same county.

97. **Vernonia concinna** sp. nov.

Stem apparently erect, simple, striate, green, glabrous, 8 dm. high; leaves numerous, thin, divaricate, oblong-linear or narrowly oblanceolate, flat, entire or with minute callous teeth, acute, narrowed to a sessile base, bright-green and glabrous above, paler beneath and sparsely pubescent with short white hairs, the principal leaves 10–12 cm. long, 0.8–1.2 cm. wide, the upper somewhat reduced; inflorescence loose, subumbellate, flattened, 1 dm. across, resembling that of *V. angustifolia;* heads about 13-flowered, 1 cm. high at maturity; involucre campanulate-turbinate, 6–7 mm. high; scales rather loosely imbricated in few series, glabrous or a little ciliate, triangular-acute or mucronate, the inner oblong-lanceolate, the outer narrower, the basal slightly spreading; achenes minutely pubescent, 3 mm. long; pappus purplish-tawny, 5–6 mm. long.

Type: *Nash 1759*, from Eustis, Lake county, Florida; in the herbarium of Columbia University. The same collection is in the National Herbarium, numbered 223166.

Vernonia concinna is also closely related to *V. angustifolia*, as is shown by the shape of the involucre and character of the inflorescence, as well as by its geographical distribution. It is abundantly different in the smooth, flat, lax leaves and the acute scales. Some forms of the latter species resemble *V. concinna* in the shape of the leaves, such as *Earle & Baker 1171* already mentioned, but they invariably have acuminate scales and scabrous leaves, some or all of which are revolute.

98. Vernonia Blodgettii Small, Fl. S. U. S. 1160. 1903

Vernonia angustifolia pumila Chapman, Bot. Gaz. 3: 5. 1878.

Stem slender, erect, faintly striate, glabrous or nearly so, simple or branching from the base, 2–6 dm. high; leaves numerous and crowded below, few and scattered above, the largest at or near the base of the stem, spreading or ascending, firm, linear or narrowly lanceolate, 4–8 cm. long, 3–6 mm. wide, obtuse or acute, entire or minutely denticulate, glabrous above, very sparsely short-pubescent beneath; upper leaves much smaller; inflorescence loose, irregular; heads all peduncled, about 21-flowered, 8 mm. high at maturity; involucre broadly campanulate or hemispheric, 5 mm. high; scales few, appressed, very loosely and irregularly imbricated, lanceolate, acute or subacute, glabrous or nearly so, the exposed portion red or purple; achenes 2.5 mm. long, sharply ribbed, pubescent in the furrows; pappus yellow, twice as long as the achenes.

Type locality: Pine Key, Florida.

Distribution: Florida.

Of the seven sheets in the herbarium of the New York Botanical Garden four have the narrow leaves and acute scales of the type, as characterized above. The other three, *Small & Wilson 1878*, *Curtiss*, and *Small & Carter 771*, have the lower leaves obtuse or even rounded at the apex, much broader and shorter, the length being only three to six times the width, and the scales sharply mucronate or even acuminate. Additional field study may prove this to be a distinct species.

The use of Chapman's varietal name for the species is prevented by the publication of the name *V. pumila* for an African species.

99. Vernonia insularis Gleason, Bull. Torrey Club 33: 184. 1906

Perennial by a horizontal rootstock; stem herbaceous or suffruticose, glabrous or minutely puberulent in the inflorescence, erect, 6–10 dm. high, simple or sparingly branched; leaves numerous, narrowly oblong-linear, 6–10 cm. long, 0.8–1.2 mm. wide, obtuse or subacute, mucronate, entire, acute or narrowed at the sessile base, one-nerved or with faint lateral veinlets, green and essentially glabrous on both sides, the upper somewhat smaller; inflorescence terminal, cymose, lax; heads 4–25, on peduncles 0.5–4 cm. long; involucre at maturity broadly campanulate or depressed-hemispheric, about 5 mm. high; scales glabrous with membranous margins, the outer lanceolate, sharply acuminate, the inner oblong, abruptly acuminate or mucronate; achenes 2 mm. long, striate, sparsely pubescent; pappus tawny, 6 mm. long, the outer series minute.

Type locality and distribution: Bahama Islands.

Uncertain or Excluded Species

Vernonia Achyrocoma Lessing, Linnaea 4: 313. 1829. (*Achyrocoma tomentosa* Cass. Dict. Sci. Nat. 26: 21. 1823.)

Vernonia aristata (Cass.) Lessing, Linnaea 4: 313. 1829. (*Lepidaploa aristata* Cass. Dict. Sci. Nat. 26: 17. 1823.)

Vernonia hypoleuca DC. Prodr. 5: 27. 1836. Differs from all known North American species in having opposite three-nerved and three-lobed leaves, and probably does not belong in the *Vernonieae*.

Vernonia inuloides DC. Prodr. 5: 62. 1836.

Vernonia profuga DeNot. Ind. Sem. Hort. Genuen. 1840.

Vernonia toluccana DC. Prodr. 5: 30. 1836. A form with opposite leaves and peculiar inflorescence, probably not belonging to the *Vernonieae*.

8. EREMOSIS (DC.) gen. nov.

Turpinia La Llave & Lex. Nov. Veg. Desc. 1: 22. 1824. Not *Turpinia* Humb. & Bonpl.

Monosis § *Eremosis* DC. Prodr. 5: 77. 1836.

? *Llerasia* Triana, Ann. Sci. Nat. IV. 9: 37. 1858.

? *Critoniopsis* Sch.-Bip. Pollichia 20–21: 430. 1863.

Heads 1–3-flowered, or rarely 5-flowered; involucre cylindric or narrowly turbinate, the innermost scales frequently deciduous with the achenes; receptacle subconvex; corollas tubular, regularly 5-cleft; anthers, stigmas, achenes and pappus as in *Vernonia*. Shrubs and small trees, freely branching and usually more or less tomentose; leaves pinnately veined, entire or denticulate; heads aggregated in close round-topped corymbose clusters terminating the branches and forming a compound panicle.

Type, *Monosis salicifolia* DC.

An American genus, related on the one hand to *Vernonia*, from which it is separated by the character of the inflorescence and the number of flowers in the head, and on the other to *Oliganthes*, from which it differs in the capillary pappus.

* Heads 1-flowered or rarely 2-flowered.

Leaves of a broad type, their width at least half their length, very abruptly short-acuminate; scales of the involucre acute, with the midvein prolonged into a conspicuous mucro. 1. *E. foliosa*.

Leaves essentially as above, acute or acutish at both ends; all scales pale-brown or straw-colored, rounded or subacute at the apex, not mucronate. 2. *E. pallens*.

Leaves of an oblong or lanceolate type, at least 2.5 times as long as wide (except in *E. Steetzii*); scales acute or subacute, not mucronate.

Leaves densely tomentose beneath.
Leaves oblong, rounded at base, 2–4 cm. wide.
3. *E. tomentosa.*
Leaves narrowly elliptic, tapering at the base.
4. *E. tarchonanthifolia.*
Leaves glabrous or sparsely hairy below.
Leaves ovate, 3 cm. wide or more. 5. *E. Steetzii.*
Leaves elliptic, 2 cm. wide or less.
Leaves glabrous beneath; involucre light-brown; scales glabrous at the tip. 6. *E. leiophylla.*
Leaves pubescent beneath, especially in the axils of the veins; involucre purplish; scales more or less tomentose at the tip.
7. *E. salicifolia.*
** Heads 3-flowered; inner scales deciduous.
Leaves pilose on the veins beneath. 8. *E. barbinervis.*
Leaves densely tomentose beneath.
Scales densely tomentose, greenish or gray.
Achenes light-brown. 9. *E. leiocarpa.*
Achenes dark-purple or nearly black. 10. *E. melanocarpa.*
Scales nearly glabrous, purplish. 11. *E. Palmeri.*
Scales glabrous above, tomentose at the base. 12. *E. purpurascens.*
Leaves glabrous or thinly pubescent beneath.
Leaves 2.5 cm. wide or less. 13. *E. trifloscula.*
Leaves 4 cm. wide or more. 14. *E. Heydeana.*
*** Heads 5-flowered. 15. *E. Shannoni.*

1. **Eremosis foliosa** (Benth.) nom. nov.

Monosis foliosa Benth. Pl. Hartweg. 19. 1839.
Vernonia foliosa Sch.-Bip. Pollichia **18–19**: 161. 1861. Not *V. foliosa* Gardn. 1846.

Low shrub; branches finely tomentose, becoming glabrate with age; leaves broadly ovate or elliptic-ovate, 4–7 cm. long, 1.5–3 cm. wide, abruptly short-acuminate, entire or with a few scattered teeth, acute to subcordate at base, thinly tomentose on both sides or becoming glabrous above; involucre 5 mm. high; outer scales short, triangular-ovate, thinly tomentose, the inner lanceolate, glabrous or puberulent, purple, tipped with a mucro 0.5 mm. long; achenes villous; pappus white, the inner series 7–8 mm. long.

Type locality: "to the north of the town of Mexico."

Distribution: central and southern Mexico.

2. **Eremosis pallens** (Sch.-Bip.) nom. nov.

Vernonia pallens Sch.-Bip. Pollichia **18-19**: 161. 1861.

Shrubby, with terete or faintly striate glabrous branches; leaves numerous, elliptic, entire, acute at both ends, glabrous on both sides,

4–5 cm. long, 1.1–1.8 cm. wide, with glabrous petioles 3–4 mm. long; heads almost sessile or with short peduncles 1–2 mm. long; involucre narrowly turbinate, 5 mm. high, pale-brown; the outer scales ovate, the inner oblong, all glabrous and rounded or subacute at the tip, not mucronate; achenes 2.5 mm. long, sparsely villous with short hairs; pappus white, 7 mm. long, the inconspicuous outer series less than half as long.

Type locality and distribution: Mexico.

The single specimen examined is from the Meisner herbarium and is labeled "*Monosis parviflora* Bartl. Mexico. Ex. Mus. Bot. Götting. Com. cl. Bartling, 1838."

Eremosis pallens and *E. foliosa* constitute a natural group, resembling each other in general habit and in the shape of the leaves. Of the two *E. pallens* approaches most nearly the remaining members of the genus.

3. **Eremosis tomentosa** (La Llave & Lex.) nom. nov.

Turpinia tomentosa La Llave & Lex. Nov. Veg. Desc. **1**: 22. 1824.

Monosis tomentosa DC. Prodr. **5**: 77. 1836.

Vernonia Monosis Sch.-Bip. Linnaea **20**: 507. 1847.

? *Vernonia paniculata* DC. Prodr. **5**: 23. 1836.

Shrubby, the stem, branches, pedicels, petioles and lower surface of the leaves covered with a close dense gray tomentum; leaves oblong or oblong-ovate, 8–12 cm. long, 4–5 cm. wide, glabrous or minutely puberulent above, entire, acute, abruptly narrowed to truncate at the base; inflorescence hemispheric, terminating all the upper branches and forming a huge leafy pyramidal panicle 2–4 dm. long and 1–3 dm. wide; heads sessile or on short peduncles; involucre cylindric, 5–6 mm. high; outer scales ovate, acute, tomentose, the inner oblong, acute, glabrous, or pubescent at the apex and margin, the exposed portion purple; achenes 3 mm. long, villous with erect hairs; pappus white, the inner series 6–7 mm. long.

Type locality: "habitat in monte excelso de Quinzeo prope Vallisoletum."

Distribution: central and southern Mexico.

This species is well represented in American herbaria and the following more recent collections are referred to it: *Pringle 2439*, *Seler 1751*, *Dugès 476a*, *Conzatti 117*. It has usually been distributed as *Vernonia paniculata* DC., which, in fact, it may be. De Candolle's description is incomplete, since he saw neither

flowers nor fruit. Bentham, in Plantae Hartwegianae, intimates that they are the same, and Hemsley has more recently used the same name for the species. The use of the older name of La Llave and Lexarza is based on *Hartweg 132*, cited by Bentham, a specimen of which is in the Gray Herbarium.

4. Eremosis tarchonanthifolia (DC.) nom. nov.

Monosis tarchonanthifolia DC. Prodr. **5**: 77. 1836.
Oliganthes Karwinskii Sch.-Bip. Linnaea **20**: 505. 1847.
Vernonia tarchonanthifolia Sch.-Bip. Linnaea **20**: 507. 1847.

A shrub 3–6 m. high, with terete branches covered when young with a close gray tomentum, becoming thin or disappearing entirely with age; leaves lanceolate or elliptic-lanceolate, 5–8 cm. long, 1.5–2 cm. wide, short-acuminate or acute at the apex, narrowed below to petioles 4–6 mm. long, entire or minutely and remotely denticulate, glabrous above, finely gray-tomentose beneath and on the petioles; inflorescence pyramidal or hemispheric, 5–10 cm. across, the branches tomentose; heads crowded, sessile or on very short peduncles; involucre cylindric to narrowly turbinate, 5–6 mm. high; outer scales triangular-ovate; inner scales longer with triangular tips, acute or obtuse, purplish, with a little tomentum near the tip; achenes villous, 2.5 mm. long; pappus yellowish-white, the inner series 7 mm. long, the outer 1 mm.

Type locality: "in Mexico."

Distribution: southern Mexico, *Pringle 5842, 6166; Smith 314, 366; Conzatti & González 554.*

Eremosis tarchonanthifolia is easily distinguished from the other members of the genus by its narrow elliptic leaves conspicuously covered below with gray tomentum. In most of the specimens examined the heads are 2-flowered, a peculiarity not observed in any of the others, and at maturity the inner scales are somewhat deciduous.

5. Eremosis Steetzii (Sch.-Bip.) nom. nov.

Vernonia Steetzii Sch.-Bip.; Seemann, Bot. Voy. Herald 297. 1856.

Shrubby, the branches obscurely ribbed, puberulent; leaves ovate, obtuse or rounded, or somewhat attenuate below, short-acuminate at the apex, denticulate with short callous teeth, minutely puberulent above, sparsely pubescent beneath, especially along the veins, 6–8 cm. long, 3–4 cm. wide; those in the inflorescence smaller, ovate-lanceolate or elliptic-ovate; inflorescence forming a hemispheric leafy panicle; heads on peduncles 1–3 mm. long;

involucre about 6 mm. high, pale-brown, lightly suffused with purple; scales all acute or short-acuminate, glabrous or nearly so; achenes densely villous with ascending hairs, 2–5 mm. long; pappus white, the inner series 6–7 mm. long, the outer much shorter.

Type locality: Sierra Madre, Mexico.

Distribution: northwestern Mexico, *Seemann; Palmer 273*.

Eremosis Steetzii callilepis (Sch.-Bip.) nom. nov.

Vernonia Steetzii callilepis Sch.-Bip. *l. c.*

Described by Schultz as follows: "foliis duplo minoribus, paulo longis petiolatis, involucri squamis non tam caducis, purpurascentibus. An spec. distincta?" Type locality the same as for the species.

6. **Eremosis leiophylla** sp. nov.

A shrub 3.4–5 m. high, with glabrous branches and foliage; branches brown, faintly ribbed; leaves numerous, oblong or elliptic-oblong, acute at both ends, entire, or with a few minute callous teeth, 3–4 cm. long, 1–1.5 cm. wide; petioles 3–4 mm. long; inflorescence terminating the branches, in hemispheric clusters 5–6 cm. across, aggregated to a large compound panicle, glabrous except for a little pubescence on the pedicels; heads sessile or short-peduncled, 1-flowered; involucre pale-brown, 5-6 mm. high; scales glabrous or minutely ciliate, acute, the outer ovate, the inner oblong, acute; corolla purplish; achenes short-villous, 2.5–3 mm. long; pappus white, 7–8 mm. long, the bristles of the outer series uneven, much shorter.

Type: *Pringle 6188*, collected November 5, 1895, on the mountains above Cuernavaca, state of Morelos; in the herbarium of Columbia University.

The species is distinguished from all other members of the group by its almost entire lack of pubescence. The size and shape of the leaves is also characteristic.

7. **Eremosis salicifolia** (DC.) nom. nov.

Monosis salicifolia DC. Prodr. **5**: 77. 1836.
Vernonia uniflora Sch.-Bip. Linnaea **20**: 506. 1847.
V. salicifolia Sch.-Bip. *l. c.* 507.

Shrubby; branches terete, covered with a thin gray arachnoid tomentum; leaves narrowly oblong-lanceolate or elliptic-lanceolate, typically 4–8 cm. long by 1–2 cm. wide, acute or subacute at the apex, entire or slightly undulate, punctate with resinous glands, glabrous or thinly tomentose on both sides, tapering below into petioles 4–6 mm. long; lateral veins ascending, with tufts of brown

tomentum in their axils; heads on peduncles 1–3 mm. long; involucre cylindric, 6 mm. high; scales in 3–4 series, ovate to oblong, acute or subacute, purplish, the outer thinly tomentose, the inner glabrous except for a tuft of tomentum at the tip; achenes 2.5 mm. long, villous, ribbed; pappus nearly white, the inner series 6 mm. long, the outer inconspicuous, 2 mm. long.

Type locality: "in Mexici montibus ad Guchinapa et Cuernavaca."

Distribution: central and southern Mexico.

8. **Eremosis barbinervis** (Sch.-Bip.) nom. nov.

Vernonia barbinervis Sch.-Bip.; Seemann, Bot. Voy. Herald 297. 1856.

Stem strongly angled, nearly glabrous; leaves broadly elliptic, 9–12 cm. long, 4–5 cm. wide, obtuse or subacute, entire, narrowed at the base, nearly glabrous above, densely tomentose along the midvein beneath; inflorescence hemispheric; involucre narrowly campanulate, 7 mm. high, its scales ovate to oblong, acute, scarious, ciliate.

Type locality: Sierra Madre, Mexico.

Distribution: northwestern Mexico, *Seemann*.

9. **Eremosis leiocarpa** (DC.) nom. nov.

Vernonia leiocarpa DC. Prodr. 5: 34. 1836.

Frutescent; branches terete, tomentose when young, glabrate with age; leaves ovate-lanceolate to ovate, 8–14 cm. long, 2–6 cm. wide, acute, entire or dentate, narrowed at base, pulverulent or nearly glabrous above, densely cinereous-tomentose below; petioles 1.5 cm. long; inflorescence large, leafy-bracted; heads very numerous, densely aggregated, sessile or minutely pedunculate; involucre cylindric or narrowly campanulate, 5–6 mm. long, but becoming shorter by the loss of the inner scales; outer scales broadly triangular-ovate, obtuse, densely tomentose, the inner becoming oblong, with the arachnoid tomentum only on the obtuse tips; achenes 2.5–3 mm. long, glabrous, pale-brown, faintly striate; pappus white, 6–7 mm. long.

Type locality: "in Mexico."

Distribution: the mountains of southern Mexico and Guatemala.

10. **Eremosis melanocarpa** sp. nov.

Frutescent, height unknown; branches terete, densely tomentose when young, becoming thinly tomentose or glabrate with age; leaves ovate or ovate-lanceolate, about 10 cm. long, 4 cm. wide, entire or obscurely toothed, acute or acuminate, narrowed at base, scabrous-pubescent or thinly tomentose above, densely cinereous-

tomentose beneath, especially along the veins, where the hairs are brown in color; petioles 1.5–2.5 cm. long; inflorescence pyramidal, dense; heads closely aggregated, sessile or nearly so; involucre narrowly campanulate, 3–4 mm. long; scales all obtuse or rounded, the outer broadly ovate or triangular, densely tomentose, the inner broadly oblong, tomentose at the apex and margin; achenes 2.5 mm. long, glabrous, dilated above, dark-purple or almost black; pappus white, 5 mm. long.

Type: *Heyde & Lux 3416*, from Depart. Santa Rosa, Guatemala; in the herbarium of Columbia University. Other specimens referred here are *Maxon & Hay 3594*, from Guatemala, and *Seler 2127*, from Chiapas, Mexico.

Closely related to *E. leiocarpa*, from which it is separated by the denser and more abundant tomentum and the character of the achenes.

11. **Eremosis Palmeri** (Rose) nom. nov.

Vernonia Palmeri Rose, Contr. U. S. Nat. Herb. **1**: 101. 1891

A bush with many stems, 1–1.5 m. high, closely sericeous-pubescent, the old wood becoming glabrous; leaves lanceolate, 7–16 cm. long, 2–3 cm. wide, entire, or sometimes remotely serrulate, somewhat pubescent above, densely so beneath; inflorescence forming large pyramidal clusters; heads short-peduncled; involucre cylindric or narrowly campanulate, 5 mm. high; scales loosely imbricated, the outer broadly triangular, pubescent, the inner progressively longer, scarious, glabrous, acute, with a prominent midvein; achenes (immature) pubescent; pappus white, 4 mm. long.

Type locality: " Alamos."

Distribution: northwestern Mexico, *Palmer 387* (type).

The amount of pubescence on the leaves seems to be variable and specimens with relatively little are quite similar to *E. triflosculosa*.

12. **Eremosis purpurascens** (Sch.-Bip.) nom. nov.

Vernonia purpurascens Sch.-Bip.; Walp. Rep. **2**: 945. 1843.
? *Vernonia paniculata* DC. Prodr. **5**: 23. 1836.

Type locality: " ad St. Pedro Nolasco in provincia Oaxaca."

No specimens have been seen which could be referred to this species. Schultz's description is almost identical with that of *V. paniculata*.

13. **Eremosis triflosculosa** (H.B.K.) nom. nov.

Vernonia triflosculosa H.B.K. Nov. Gen. **4**: 40. 1818.
Gymnanthemum congestum Cass. Dict. Sci. Nat. **20**: 110. 1821.

Vernonia triantha Schauer, Linnaea **19**: 714. 1847.
Vernonia luxensis Coulter, Bot. Gaz. **20**: 41. 1895.
Vernonia dumeta Klatt, Bull. Soc. Roy. Bot. Belg. **35**: 277. 1896.

Shrubby or arborescent, 3 m. high; branches striate, thinly pubescent or glabrescent; leaves rather numerous, oblanceolate to elliptic, tapering at base, acute, entire or nearly so, 8–12 cm. long, 1.5–3 cm. wide, green above, paler below, essentially glabrous on both sides, the midvein prominent; inflorescence conic or hemispheric, the heads very numerous, aggregated by twos and threes on short peduncles; involucre cylindric, 4–5 mm. high; scales loosely imbricated, the outer subrotund or ovate, the inner oblong, all scarious, acute, glabrous or nearly so on the back, minutely ciliate; achenes 3 mm. long, pubescent; pappus white, 5 mm. long.

Type locality: "crescit in montibus Mexicanis prope Acaguisotla, alt. 500 hex."

Distribution: from southern Mexico to Costa Rica.

14. Eremosis Heydeana (Coulter) nom. nov.

Vernonia Heydeana Coulter, Bot. Gaz. **20**: 42. 1895.

Stem woody, striate, puberulent or glabrate; leaves elliptic or ovate, 8–10 cm. long, 4.5–6 cm. wide, acute, entire or remotely denticulate, acute at the base, very sparsely pubescent above, thinly tomentose beneath or glabrescent with age; inflorescence hemispheric to pyramidal, crowded; involucre narrowly campanulate, 6 mm. high; scales ovate to oblong-ovate, obtuse, ciliate; achenes glabrous or minutely glandular, 3 mm. long; pappus white.

Type locality: San Miguel, Uspantán, Depart. Quiché, Guatemala.

Distribution: Guatemala, *Heyde & Lux 3392* (type), and Mexico, *Smith 371*.

The original description indicates 6-flowered heads, but all those examined have three flowers. The broad, ovate leaves are the most characteristic feature of the species.

15. Eremosis Shannoni (Coulter) nom. nov.

Vernonia Shannoni Coulter, Bot. Gaz. **20**: 42. 1895.

"Leaves long-oval, taper-pointed at each end, petioled, entire, glabrous, heads 5-flowered, somewhat closely corymbose and pedicellate: involucral scales in five or six rows, the inner ones elongated-oblong and obtuse, the outer * * * broadly ovate and acutish, * * * achenes glabrous."

Specimens of this species have not been examined, but the scanty description corresponds so closely with the generic characters of *Eremosis* that it is included here.

Type locality: Depart. San Márcos, alt. 9191 ft.

9. OLIGANTHES Cass. Bull. Soc. Philom. **1817**: 10. 1817; **1818**: 58. 1818

Dialesta H.B.K. Nov. Gen. **4**: 44. 1818.

Heads 1–8-flowered, aggregated in dense corymbiform panicles terminating the stem and branches; involucre cylindric or narrowly campanulate; scales membranous or scarious; receptacle subconvex; corolla regular, the limb deeply 5-cleft; anthers sagittate, obtuse at the base; achenes ribbed; pappus typically in two series, the inner or both sometimes caducous, of linear flat scales, which are twisted towards the apex. Shrubs or small trees, with usually broad tomentose leaves and dense panicles resembling those of *Eremosis*.

Type, *O. triflora* Cass.

A genus of tropical America, containing several species which vary greatly in the structure of the pappus and which were formerly included in five different genera. As limited by Bentham and Hooker the genus is too close to *Piptocoma*.

Heads 1-flowered.	1. *O. discolor*.
Heads 8-flowered.	2. *O. oxylepis*.

1. OLIGANTHES DISCOLOR (H.B.K.) Sch.-Bip. Linnaea **20**: 502. 1847

Dialesta discolor H.B.K. Nov. Gen. **4**: 45. 1818.

Stem closely cinereous; leaves ovate-lanceolate, 10 cm. long, 5 cm. wide, acuminate, entire, narrowed at the base, rugose and glabrate above, tomentulose beneath, especially on the veins, and with numerous short hairs; heads 1-flowered, densely aggregated on peduncles 5 mm. long; involucre 5 mm. high; scales curved, appressed, ciliate, glabrous on the back or the outer tomentose, the outer obtuse, ovate, the inner oblong, acute; achenes glabrous, 1.5 mm. long; outer pappus of about 5 short ovate fimbrillate scales, the inner of flat twisted scales 2.5 mm. long.

Type locality: "in calidis prope Honda Novo-Granatensium."

Distribution: Costa Rica, *Pittier 4910*, south to Colombia.

2. OLIGANTHES OXYLEPIS Benth.; Benth. & Hook. Gen. Pl. **2**: 233. 1873

Heads 8-flowered; leaves dentate. No specimens seen.

Type locality: Yucatan.

10. PIPTOCOMA Cass. Bull. Soc. Philom. 1817: 10. 1817

Heads about 8–11-flowered; involucre campanulate; scales imbricated in several series; receptacle flat; corollas regularly 5-cleft; anthers sagittate, obtuse at the base; achenes 5-angled; pappus double, the outer of short scales, the inner of elongate, linear, somewhat twisted, caducous scales. Shrubby; heads in terminal corymbiform clusters; leaves ferruginous-tomentose beneath.

A monotypic genus of Hispaniola, Porto Rico, and St. Thomas, closely related to *Oliganthes*, from which it differs in the many-flowered heads which are somewhat larger and less closely aggregated than in that genus. Schultz did not consider these differences sufficient to warrant their separation, and united the two under the name *Oliganthes*.

PIPTOCOMA RUFESCENS Cass. *l. c.* 1817

Eupatorium domingense Sprengel, Syst. Veg. 3: 412. 1826.
Oliganthes rufescens Sch.-Bip. Pollichia 20–21: 338. 1863.

Shrubby, freely branching; stems angled, thinly cinereous or canescent, the young shoots strongly angled and ferruginous; leaves lanceolate-oblong, obtuse, narrowed at the base, 4–5 cm. long, 1–1.5 cm. wide, green and finely stellate-pubescent above, reticulately veined and densely ferruginous beneath; petioles 3 mm. long; involucre 4 mm. high, its scales closely imbricated, ovate, obtuse, all tomentose, the inner at the apex only; achenes nearly glabrous, 2 mm. long; pappus yellowish-white, 5 mm. long.

Type locality: Hispaniola.

Distribution: Hispaniola, Porto Rico and St. Thomas.

11. BOLANOSA A. Gray, Pl. Wright. 1: 82. 1852

Heads large, many-flowered, 1–2 cm. across, single, or 2–5 in dense corymbs, terminating the stem or branches; involucre broadly hemispheric, the scales imbricated in several series, the outer gradually shorter; receptacle flat, bearing oblong, conduplicate, scarious scales 6–8 mm. long; corolla regular, 5-cleft; achenes irregularly angled, obtusely 10-ribbed, turbinate, truncate; pappus in two series, the outer of short flat linear acuminate scales, the inner of long linear scales. Floccose or tomentose herbs; leaves alternate, sessile.

A monotypic genus of western Mexico.

BOLANOSA COULTERI A. Gray. *l. c.*

Stem erect, leafy, simple to the inflorescence or with a few branches in the axils above, floccose with white wool, becoming glabrous below; leaves ovate-lanceolate to narrowly elliptic-

oblong, 5–10 cm. long, 1.5–3 cm. wide, remotely denticulate, acute, narrowed to a subsessile base, glabrous above, or floccose when young, densely fulvous-tomentose beneath; the upper leaves gradually reduced to 2–3 cm. in length; involucre white-floccose; scales oblong-lanceolate, the inner glabrous and colored red at the tip; chaff of the receptacle narrowly oblong; achenes 3 mm. long, densely hirsute with ascending white hairs; pappus white, the bristles slightly ciliate, the outer series 4 mm., the inner 9 mm. long.

Type locality: "Bolanos, northern Mexico."

Distribution: Jalisco, western Mexico.

12. STOKESIA L'Herit. Sert. Angl. 16. 1788

Heads many-flowered, on terminal peduncles; involucre depressed-hemispheric, its scales imbricated in several series, the outer with foliaceous spreading tips, the inner membranous, appressed; corolla 5-cleft, the central ones nearly regular, the marginal ones much larger and appearing ligulate; achenes 3–4-angled, truncate; pappus of 4–5 narrow caducous scales. Herbaceous perennial with leafy stem; leaves alternate, the lower petioled, the upper sessile and clasping; heads large; corollas blue.

A monotypic genus of the southeastern United States.

STOKESIA LAEVIS (Hill) Greene, Erythea 1: 3. 1893

Carthamus laevis Hill, Hort. Kew. 57. *pl. 5.* 1769.
Stokesia cyanea L'Herit. Sert. Angl. 17. 1788.

Type locality: "Carolina."

Distribution: the coastal plain of the southeastern United States, from South Carolina to Louisiana.

13. ORTHOPAPPUS gen. nov.

Heads 4-flowered, aggregated into glomerules subtended by 1–2 bract-like leaves; involucre of eight scales arranged in decussate pairs, the two outer pairs much shorter than the inner, and the alternate pairs conduplicate; corolla as in *Elephantopus* L.; achenes 10-striate; pappus of about 30 uniform bristles, very slightly enlarged at the base. Herbaceous; principal leaves basal, the cauline reduced or bract-like; inflorescence spicate or the lower glomerules peduncled.

Type, *Elephantopus angustifolius* Sw.

The generic name refers to the straight uniform bristles of the pappus, a feature which distinguishes it from the nearly related genera *Elephantopus* and *Pseudelephantopus*.

Orthopappus is the only genus of the group *Elephantopeae* in which the pappus consists of numerous simple bristles. In the other genera they are limited in number, and more or less modified into scales at the base, or twisted and contorted towards the apex, or disposed in two evident series. So far as known the genus includes but one species, *O. angustifolius*, which however is very variable and may include several distinct forms.

The first recognition of the generic rank of the species was by Lessing, who included it, under the synonym *E. quadriflora*, in his new genus *Elephantosis*. The first species described in that genus was *Elephantosis biflora*, which must remain as the type, and to which the name still applies. *Elephantosis biflora* Lessing has a biseriate pappus, the scales of the outer series short and persistent, those of the inner long, flat, slightly twisted, and deciduous. The achenes of both species were figured by Lessing, and show the distinguishing characters well. In the same paper Lessing also described *Elephantopus angustifolius* Sw. The description agrees throughout with that of *Elephantosis quadriflora*, and his error was certainly due to the immature achenes of his specimens of *E. angustifolia*. De Candolle followed Lessing in the use of the genus *Elephantosis* and included in it Swartz's *Elephantopus angustifolius* without recognizing its identity with *Elephantosis quadriflora*. Schultz, in Linnaea **20**: 517 (1847), left *Elephantopus angustifolius* in *Elephantosis*, which he regarded as a section of *Elephantopus*, and created the new section *Elephantopsis* for Lessing's *Elephantosis biflora*. In the last treatment of the genus C. F. Baker (Trans. Acad. Sci. St. Louis **12**: 43. 1902) also includes *Elephantopus angustifolius* under *Elephantosis*, and is obviously in error when he states (page 45) that it is the type of the genus.

As a matter of fact the name *Elephantosis* belongs to *E. biflora*, and *Elephantopsis* is merely a synonym. Accordingly *Elephantopus angustifolius* of Swartz, here considered generically distinct, is left without a generic name, for which *Orthopappus* is now proposed.

Orthopappus angustifolius (Sw.) nom. nov.

Elephantopus angustifolius Sw. Prodr. Veg. Ind. Occ. 115. 1788.

Elephantopus nudiflorus Willd. Sp. Pl. **3**: 2390. 1804.

Elephantosis quadriflora Lessing, Linnaea 4: 323. 1829.
Elephantosis angustifolius DC. Prodr. 5: 87. 1836.

Type locality: Jamaica.

Distribution: from Cuba and Mexico south through the West Indies and Central America to Paraguay and Bolivia.

14. ELEPHANTOPUS L. Sp. Pl. 814. 1753

Heads 1–5-flowered, aggregated into glomerules of one to several heads subtended by 1–3 foliaceous bracts; involucre of four decussate pairs of scales, the outer two shorter, the alternate pairs conduplicate; receptacle flat or nearly so; corolla-tube slender, the limb unequally 5-cleft with a much deeper fissure on the inner side; achenes truncate, ribbed; pappus of about 5 bristles dilated at the base. Herbs with leafy or scapiform stems, alternate or basal leaves, and corymbed pedunculate glomerules.

Type, *Elephantopus scaber* L.

About 14 species of tropical and subtropical distribution, rarely extending into the temperate zone, and mostly confined to the western hemisphere.

Bracts prolonged at the apex into a ligulate tip. 1. *E. pratensis.*
Bracts acute to acuminate, not prolonged into a tip.
  Pappus-bristles abruptly dilated into deltoid or broadly triangular bases.
    Stems leafy.
      Leaves oblong-elliptic to ovate, exceeding 2 cm. in width. 2. *E. mollis.*
      Leaves narrowly oblong-oblanceolate, about 1 cm. wide. 3. *E. dilatatus.*
    Stems nearly scapose. 4. *E. nudatus.*
  Pappus-bristles gradually dilated into narrowly triangular bases.
    Stems leafy. 5. *E. carolinianus*
    Stems essentially leafless, or with a few reduced leaves subtending the branches.
      Scales densely villous with long hairs. 6. *E. elatus.*
      Scales not densely villous.
        Leaves softly pubescent below, pubescent or glabrate above. 7. *E. tomentosus.*
        Leaves scabrellate above. 8. *E. scaber.*

1. ELEPHANTOPUS PRATENSIS Wright; Sauvalle, Anal. Acad. Ci. Habana 6: 177. 1869

Stem branching from the base, erect or ascending, 1–4 dm. high, hirsute-pubescent, especially below, or becoming glabrate above; leaves narrowly oblanceolate, entire, obtuse, acuminate at the base, glabrous or pubescent; glomerules mostly solitary on long peduncles;

bracts 2–3, cordate-orbicular with a prominent ligulate tip 5–10 mm. long.

Type locality and distribution: Cuba.

2. Elephantopus mollis H.B.K. Nov. Gen. **4**: 26. 1818

Type locality: " crescit in provinciis Cumanae et Caracas."

Distribution: from Cuba and Lower California south into South America.

3. **Elephantopus dilatatus** sp. nov.

Stem erect, 3 dm. high, hirsute with brown hairs, densely so below, bearing several leaves separated by short internodes near the base and others scattered above; leaves thick, narrowly oblong-oblanceolate, 6–10 cm. long, 9–12 mm. wide, acute or subacute, remotely serrulate with low erect teeth, long-attenuate below, sparsely pilose with stiff appressed hairs on both sides, but especially on the veins beneath; inflorescence freely branching, bearing numerous glomerules on long sparsely pilose peduncles; bracts 3, broadly ovate, acuminate, prominently reticulated, pilose, equaling or shorter than the heads; involucre 7 mm. high; scales abruptly acuminate into a cuspidate tip, nearly glabrous below, glandular and sparsely pilose with short hairs toward the tip; achenes 2 mm. long, furrowed, minutely pubescent; pappus exceeding the achene, its bristles very abruptly dilated below into depressed broadly triangular bases.

Type: *Pittier 3733*, bords du Rio Ceibo, Buenos Aires, Costa Rica; in the Gray Herbarium. In the shape, size and pubescence of the leaves it resembles very closely the Brazilian *E. riparius* Gardn. but differs in the larger broader bracts and the short broadly dilated bases of the pappus-bristles.

4. Elephantopus nudatus A. Gray, Proc. Am. Acad. **15**: 47. 1879

Type locality: Oxford, Delaware.

Distribution: from Delaware and Maryland south to Florida and west to Louisiana and Arkansas, mostly near the coast.

5. Elephantopus carolinianus Willd. Sp. Pl. **3**: 2390. 1804

Elephantopus violaceus Sch.-Bip. Linnaea **20**: 517. 1847.

Type locality: " habitat in Carolina, Florida, Jamaica."

Distribution: from New Jersey west to Illinois and Kansas, south to Florida and Texas, and apparently in Mexico and the West Indies.

6. Elephantopus elatus Bert. Misc. Bot. **11**: 21. 1851

Stems erect, rather sparingly branched, 5–10 dm. tall, leafless or with 1 or 2 cauline leaves, hirsute-pubescent, becoming densely tomentose above; basal leaves spatulate, oblanceolate or oblong, 1.5–2.5 dm. long, 3–6 cm. wide, obtuse, crenate, densely pubescent below; glomerules 1–1.5 cm. high, about equaled by the broadly ovate or triangular, short-acuminate, densely gray-pubescent bracts; scales densely villous with erect white hairs.

Distribution: South Carolina to Florida, thence west to Alabama and southern Arkansas.

7. Elephantopus tomentosus L. Sp. Pl. 814. 1753

Elephantopus nudicaulis Poir. Encyc. Suppl. **2**: 543. 1811.
Elephantopus nudicaulis Ell. Sk. **2**: 481. 1823.
Elephantopus carolinianus simplex Nutt. Gen. **2**: 187. 1818.

Type locality: "habitat in Virginia."

Distribution: from North Carolina, southeastern Kentucky and Tennessee, south to the Gulf and west to eastern Texas.

8. Elephantopus scaber L. Sp. Pl. 814. 1753

Stem erect, 2–4 dm. high, branching from the base, hirsute-pubescent; leaves oblong to obovate, crenate, acute or obtuse, narrowed at the base into margined petioles, more or less tomentose beneath, scabrous or scabrellate above; glomerules 1–1.5 cm. high; bracts broadly ovate, acute, hirsute and reticulate beneath; scales long-acuminate; achenes 3–4 mm. long, glabrous on the ribs, hirsute in the furrows.

Type locality: "habitat in Indiis."

Distribution: tropics of the Old World; sparingly introduced into the West Indies, Central America and South America.

The last two species are very closely related, and are scarcely distinguishable except by the broader, softer leaves of the former and the geographical distribution. By Schultz and some other botanists, they have been combined.

Doubtful Species

Elephantopus litoralis, *E. glaber*, *E. colimensis* Sessé & Moc. Fl. Mex. 216 (1896), are probably all synonyms of *Pseudelephantopus spicatus* (Juss.) Rohr.

15. PSEUDELEPHANTOPUS Rohr, Skrivt. Nat. Selsk. Kiob. 2 : 213. 1792

Distreptus Cass. Bull. Soc. Philom. 1817 : 66. 1817. — Dict. Sci. Nat. 13 : 366. 1819.

Heads 4-flowered, aggregated into sessile glomerules of 1–5 heads subtended by usually two bract-like leaves; involucre of four pairs of decussate scales, the first and third pairs conduplicate, the outer two pairs shorter than the inner; corolla as in *Elephantopus;* achenes 10-striate, flattened; pappus of 5–15 bristles, the two lateral ones longer and thicker than the intermediate ones and plicate or contorted at the tip. Stems leafy, freely branching; leaves dilated and clasping at the base; inflorescence terminal, of panicled spikes.

Type, *Elephantopus spicatus* Juss.

The genus is well characterized by the sessile glomerules of few heads and the dissimilar pappus-bristles bent or twisted near the tip. Besides the single North American species, which is very variable and may cover several distinct forms, the Bolivian *Spirochaeta Funckii* Turcz. may also be included in the genus.

PSEUDELEPHANTOPUS SPICATUS (Juss.) Rohr, Skrivt. Nat. Selsk. Kiob. 2 : 213. 1792

Elephantopus spicatus Juss.; Aubl. Pl. Gui. 2 : 808. 1775.
Distreptus spicatus Cass. Dict. Sci. Nat. 13 : 367. 1819.

Type locality : " la Guiane françoise."

Distribution : from Cuba and central Mexico south into South America.

16. ROLANDRA Rottb. Coll. Soc. Med. Havn. 2 : 256. 1775

Heads 1-flowered, subtended each by a chaffy bract and aggregated into dense axillary glomerules; involucre of two scales, the outer larger and enclosing the inner; corolla 4-lobed; style 2-cleft, the lobes scarcely separate; pappus a short irregularly toothed crown. Stem herbaceous, leafy; leaves alternate, white-tomentose beneath.

A monotypic genus of tropical America.

ROLANDRA FRUTICOSA (L.) Kuntze, Rev. Gen. Pl. 1 : 360. 1891

Echinops fruticosa L. Sp. Pl. 815. 1753.
Rolandra argentea Rottb. Coll. Soc. Med. Havn. 2 : 258. 1775.

Stems erect, sparingly branched, 2–8 dm. high, finely puberulent; leaves oblong to elliptic, 3–10 cm. long, acute or short-acuminate, entire or undulate, narrowed below into short pubescent petioles,

scabrellate above, tomentose beneath; glomerules numerous, dense, 1–1.5 cm. in diameter; involucre 4–5 mm. high, the outer scale slightly exceeding the inner and each tipped with a straight or bent spine; achene glabrous, 2 mm. long; pappus 0.5–1 mm. long, of numerous unequal fimbriate segments.

Type locality: "habitat in America meridionali."

Distribution: from Porto Rico south through the West Indies to Brazil.

17. SPIRACANTHA H.B.K. Nov. Gen. 4: 28. 1818

Heads 1-flowered, aggregated into glomerules of 12–20 heads, each subtended by a coriaceous spinous bract; inflorescence capitate, of several glomerules, subtended by 3 or 4 foliaceous bracts; involucre of 5 or 6 scales in two series; corolla 4- or 5-lobed; style 2-lobed, with short branches; achene slightly compressed, obscurely 5-nerved; pappus of numerous stout erect unequal scales. Stem suffruticose, branching, bearing the spiny capitate glomerules on axillary or terminal peduncles.

A monotypic genus of tropical America.

Spiracantha cornifolia H.B.K. Nov. Gen. 4: 29. 1818

Stem low, loosely branched, pubescent, 2–4 dm. high; leaves petioled, ovate, acute, entire, sparsely pubescent above, pale and thinly tomentose beneath; peduncles pubescent, the subtending leaves thin, ovate; glomerules ovoid; bracts oblong, hirsute above, broadly rounded at the apex and bearing a squarrose spine one-third to one-half the length of the bract; heads 3–4 mm. high; scales linear, thin, glabrous, sharply acuminate, 1-nerved, 3 mm. long, beset at the base with hairs of the same length; achene obovoid, glabrous, 2 mm. long.

Type locality: "crescit in umbrosis humidis ad portum Sapote prope Rio Sinu."

Distribution: from Yucatan south to Colombia.

The Chareae of North America

By Charles Budd Robinson

The Characeae form a group of slender aquatic plants of very wide distribution, inhabiting fresh, brackish, or very rarely salt water. They are of varied size and habit, their color depending to a considerable extent upon the absence or presence of incrustation, ranging thus from an intense bright-green or dark-green to grayish. They generally form large masses and grow submerged at depths up to at least 12 meters, but most often 2 meters or less, frequently in pools of such a nature that they completely dry at some seasons, the plants accordingly being subjected to extreme changes in environment. They are often very fragile, both when living and dried, whence one of their common names, Brittleworts; they are also frequently called Stoneworts. Most forms have an unpleasant odor, resembling that of sulphuretted hydrogen. They constitute an extremely natural group, with no very near relatives. Among themselves with a comparatively simple structure they present a great variety of differences, which have made their specific limits difficult to ascertain.

Sexual reproduction takes place by means of antheridia and oögonia. The oögonium originates as a naked cell which elongates and divides by horizontal walls into three, of which the apical becomes ultimately the oöspore, and the middle or stalk cell undergoes no further division, but is usually concealed in the developing sporocarp. The basal cell of the three forms five superficial cells, from each of which a cell begins to grow upward to envelop the oösphere. Each enveloping cell divides into an upper and a lower; the latter elongates and becomes spirally twisted, but does not again divide.

These cells of the lower tier closely invest the oösphere, which after fertilization becomes the oöspore, their lines of contact showing in later development as a series of more or less distinct ridges or striae upon the spore. The number of striae thus seen is accordingly five times the number of turns made by the spiral envelope in the length of the spore, this number ranging from one to three or very rarely more, though nearly definite for a given species. In practice it is always more convenient to count the striae. The five cells

of the upper tier elongate but little and form the crown-cells, which are however raised above the oösphere by the growth of the lower cells, and sometimes again divide by transverse walls, thus forming two superimposed rows, each of five cells. This is taken as the primary basis for dividing the Characeae into two subfamilies, the Chareae with five crown-cells and the Nitelleae with ten. These are further separated, the former into four and the latter into two genera, according to the relative positions of the antheridia and oögonia. Both genera of the Nitelleae, *Nitella* and *Tolypella*, are well represented in North America, the latter perhaps attaining its best development here, though of the Chareae the typical genus *Chara* has alone been reported.

Characeae are either monoecious or dioecious. In *Chara* the antheridia are the terminal cells of metamorphosed leaflets, while the oögonia arise from the basal cells of the leaflets, on their upper side. In the monoecious species both kinds of organs are thus in close proximity to one another, except in a few where the antheridia and the oögonia are at different leaf-nodes though borne on the same plant. In all cases the antheridia tend to develop first, and often fall off before the oöspores mature; great caution must therefore be exercised in calling species dioecious. After fertilization the oögonia increase greatly in size, owing to the growth of the oöspore and the enveloping cells; the resulting body is here called the sporocarp.

The absence or presence of cortication, often a conspicuous feature, was originally considered the chief distinction between the genera, but this has been found misleading. Cortication is never found except in the Chareae, but even in this subfamily many species are entirely uncorticated, one of these apparently having its closest relationships with one of the highest groups of *Chara*.

The development has long been known. On germination, the oöspore divides transversely to its long axis into two cells, a larger which has no further function than to part with its contents to serve as food for the young plant, and a smaller which again divides into two by a wall parallel to the long axis of the spore. One of these two becomes the primary root. The other elongates and divides into a few cells, two of which become nodes, and from the lower of these a number of rhizoids are formed. The upper node divides into two cells, each of which separates off a superficial layer of cells. The first cell of the latter to be formed produces by its successive divisions the entire permanent plant, which thus obviously origi-

nates not as a direct growth from the spore, but as a bud from the pro-embryo. The remaining cells of the upper node give rise merely to rudimentary leaves.

The development of new cells from the growing point proceeds uniformly throughout the entire plant, from the first division in the first formed pro-embryonic superficial node-cell until the cessation of growth, which is more or less indefinite, especially in perennial species.

The growing point or apical cell first divides transversely into two, a new apical cell, and what is known as the segment-cell, the former enlarging somewhat and again dividing similarly an indefinite number of times.

The segment-cells thus formed have a uniform history. Each divides by a transverse wall into two, and the lower of these becomes elongated, its ultimate length being most often from 2 to 10 cm., but it never undergoes further division. Such cells are the internodes. The node or upper division of the segment-cell elongates very slightly, but is capable of division and from it all the remaining parts are produced. It first divides into two, then each of these separates off a superficial cell, which divides into a variable number of cells. These latter, following the same plan of division as the apical cell of the stem, proceed to form long slender organs, called leaves, which maintain the same succession of nodes and internodes, but their number is usually fairly definite in any given species. In the genus *Chara*, a cell segmented off from the inner side of that node-cell which forms the first of these leaves, often gives rise to a branch, which exactly repeats the history of the stem. Branches may be formed at any node, and may even in their turn give rise to branches, in which case the plants may appear bushy in spite of the slenderness of their stems. This appearance is also, and much more frequently, due to luxuriant growth of the leaves or leaflets. From the leaf-nodes leaflets are produced, but these do not divide and are never corticated. On the anterior side of the leaf-nodes, too, the sexual organs, antheridia and oögonia, are borne, and the leaflets surrounding these, known as bracts when the Characeae were considered to be flowering plants, are perhaps better called (though this name too is unsatisfactory) bracteoles. They are usually larger than the leaflets at the sterile nodes. Taking any individual node into consideration, leaflets or bracteoles may be similar or very different; when the latter is the case, the posterior are nearly always the smaller, often greatly reduced, or even wanting.

From the superficial nodal cells of the stems of the Chareae two other classes of outgrowths may arise, simultaneously with the leaves. Outside of the basal cell on which the leaves are borne, a whorl of cells is cut off, which in some species remain undivided, in others form two whorls, or in one non-American species three, lying superimposed in the direction of the axis of the plant. These are here called stipulodes. They sometimes remain quite small; more frequently they elongate without division, resembling the leaflets and the spine-cells.

All of the Nitelleae and some of the Chareae are entirely without cortex, but the great majority of the latter possess one of varying complexity. Sometimes both stem and leaves are corticated, less often the stem only. When present, this cortex originates from the node-cells at the same time as the leaves or leaflets, and completely surrounds the internodes, growing step by step with them so that they are completly enclosed. In extremely rare cases cortical cells are produced which incompletely cover the internodes, as regards either length or circumference.

In its most perfect development the cortex of the stem is formed in the following way. From the basal nodal cell of each leaf one cortical cell grows upwards and one downwards on the surface of the stem-internodes, meeting similar cortical cells from the stem-nodes above and below. The number of these cortical cells is thus the same as that of the leaves, except that no ascending cell is produced by a leaf in whose axil a branch is formed. The original cortical cells cut off nodes and internodes from a terminal cell as in other cases, and, as before, the internodes elongate, often very considerably, but do not divide. The cortical node-cells divide into a deeper one in contact with the stem-internode, and three lying side by side on the surface. The two lateral of these form secondary cortical cells which grow both upwards and downwards, separating the primary ones, meeting corresponding cells from the cortical nodes above and below, and contiguous to similar secondary cells produced by the primary nodes of the rows to the right and the left. It is obvious that the total number of rows of cortical cells is then three times the number of the leaves; the stem is therefore said to be triply corticated. This fact can be ascertained by actually counting leaves and cortical rows. Further, the secondary cortical cells never divide, hence nodal cells are found only in the primary rows, and in most cases the nature of the cortex can be quickly learned by as-

certaining how many rows of secondary cells, if any, lie between two successive primaries. There is yet another aid. The central one of the three superficial cortical node-cells sometimes is small, sometimes large, but very often grows out into a papilla or by further elongation into a spine-cell which may be very long and conspicuous. Spine-cells are never borne except at a cortical node-cell, hence they are often of assistance in locating the latter. Spine-cells usually occur singly, more rarely in pairs or threes, and become more scattered as the cells become mature through the elongation of the intervening cortical internodes. They can never occur except upon corticated stems.

It is unusual to find such perfect or regular development, and deviations from this type are of high diagnostic value in separating species or at least groups of species. In some cases secondary cells develop on both sides of a primary but grow very much more in one longitudinal direction than the other; sometimes they are formed on one side only; sometimes no secondary cells occur, in which case the spine-cells are usually very well developed. The first of these is undoubtedly a case of abnormal triple cortication, but as the number of cortical cells seen in a cross-section would be about twice that of the leaves it has sometimes been described as double; the second case is true double cortication; the last single. All these would cause a reduction in the number of cells seen in a transverse section; at times, however, the ends of two secondary cells slip past one another, thus increasing the number between the primaries for a part of the distance. In most species when they differ the primary cells are larger or more prominent than the secondary; sometimes the reverse is the case.

The cortex of the leaves is much simpler. The number of rows is either once, twice, or thrice that of the leaflets; but all the cortical cells of the leaves are derived from the leaf-nodes, for the cells sent upwards and downwards do not form nodes and internodes but remain undivided, meeting similar cells from the next underlying or overlying nodes near the middle of the internodes. No cortical cell, however, grows upwards on the leaf from its basal node, so that the lowest leaf-internode is corticated only by the cells descending from the leaf-node above it; in some cases these too are wanting and the lowest node of the leaf remains uncorticated. The terminal internodes of the leaves are often uncorticated.

The permanent plants are anchored by long hyaline rhizoids which grow downwards from the lower nodes of the stem.

Reproduction is normally sexual. In some of the dioecious species, antheridia are very rarely found and development must in many cases be parthenogenetic. Vegetative multiplication also takes place in various ways: by bulblets, formed upon either stem or rhizoids, by branches with naked base, or by branches similar in all respects except origin to the pro-embryos.

The systematic eccentricities of the family are of this nature. When thoroughly understood a great majority of the plants collected will fall with perfect distinctness into a few well-marked groups, though more than one under the prevailing nomenclature is spoken of as a species. Yet within the limits of these groups the differences may be very considerable and of the most varied nature. Even a so-called variety may come to comprise plants which show many distinguishing characters. Further, the grouping thus produced sets at defiance all laws of geographical distribution. *Chara fragilis* Desv. is reported from all of the continents; *Chara gymnopitys* A. Br. was originally described from Tasmania, *C. gymnopitys keukensis* Allen from Lake Keuka in New York State. Here the species and so-called variety are very different, though certainly in the same group; in the other case plants from Asia and America greatly resemble one another.

Again, the dioecious *C. canescens* Loisel. is widely distributed in Europe, but male plants have been collected on extremely few occasions. It occurs in eastern America, although here male plants seem unknown. But in the west of America, from the Saskatchewan to California, there occur two extremely similar species, *C. hirsuta* Allen and *C. evoluta* Allen, unquestionably monoecious, and another species frequently identified with the last has been collected in central Asia. *C. canescens*, generally known by its later name *C. crinita* Wallr., in its European acceptation is an aggregate species, but were it not for this one seemingly constant character *C. evoluta* would certainly not be the first species to be segregated from it.

It is at present the custom to divide these blanket species into "forms," and when this is done the latter are almost always found to have a well-marked distribution, limited only too often to a single pool. But so far as evidence is available, there is every reason to believe that each form retains its peculiarities constant for long periods of time. It might seem that the proper course of procedure is to raise these forms to specific rank, but to this there are objections. The number of resulting species not only would be very

great, but it would be impossible to characterize them. The aim here has been to take a middle course. The wide view of species seems entirely untenable, but the effort throughout has been to make the segregations conservatively. Definite measurements are essential to the descriptions and often afford valuable characters. But a *Chara* has but a few nodes and internodes, of necessarily different ages, and the upper ones almost always have different dimensions from the lower and more mature. The data given here are intended primarily to represent the latter, but also to include all parts which have assumed a quasi-final form. Much emphasis has been laid by others upon the size of the spore, and this is often a good character. But spores, like other things, are of different sizes at different ages, and it is extremely desirable to have perfectly mature material. Unfortunately it is often impossible to tell whether a spore is fully mature or not, as the final appearance is reached before it attains its full size.

The observer should guard against another source of error. Besides the normal sporocarps there are found in many species others of a different shape, usually nearly globular except for the crown-cells, the oöspores yellow or orange in color, often glistening, and crowded with starch. Their true significance is not clear, but they afford no characters of systematic importance, except that as a rule the crown-cells resemble those of the normal sporocarps, and the striae upon the oöspore, though fainter, seem to be of the typical number for the species. Oöspores which are either globular or yellow should be viewed with suspicion. A few species in other respects quite distinct are here described with such oöspores. In these cases it is believed that although the species will prove good, and can be recognized by the vegetative characters, the description will require future emendation. The brown oöspores of some of the best-known species are not to be confused with the yellow ones above mentioned.

The most plausible explanation of the name *Chara* is that it was used in ancient times in southern France and northern Italy for *Carum* and other allied plants. From the resemblance of its whorled leaves to the inflorescence of the umbellifers, the true *Chara* was first included, and now monopolizes the name. It is much more often said to be a literal rendering of the Greek χαρά, joy or delight, supposed by some to indicate their fondness for water, by others their effect when observed by the eye alone; others connect

it with the idea of a star, as it had previously been given to a constellation. All are guesses, as no explanation was given by Vaillant, who, in 1719, introduced the name.

The species were previously and indeed subsequently included in other groups, *Equisetum* and *Hippuris* especially, now known to be very different, but all plants of more or less similar habitat and habit. The first mention is by Pliny in his Natural History as an *Equisetum* "with leaves like a pine"; but the more modern history of the genus dates from Caspar Bauhin's *Pinax Theatri Botanici* in 1623, where it is called "*Equisetum foetidum sub aqua repens*," and placed between *Sparganium* and *Arundo*. In the first edition of the *Genera Plantarum*, 1737, Linnaeus places them in the Algae between *Pilularia* and *Fucus;* and in the first edition of the *Species Plantarum*, 1753, they are so retained, with four species, though now between *Lichen* and *Tremella*. In 1778, however, Linnaeus transferred them to the flowering plants among the Monoecia Monandria, and this view became very prevalent and persisted for many years. Most of his immediate successors, however, followed his earlier opinion and treated them as cryptogams.

By Adanson, in 1763, they were included in his family *Ara* (aroids), which comprised such genera as *Potamogeton*, *Isoëtes*, *Alga* (= *Zostera*), *Callitriche*, *Myriophyllon*, *Ceratophyllon*, and *Pluvialis* (= *Naias*), between the two last of which *Chara* was placed. In 1789, A. L. de Jussieu put them in the Naiades, between *Hippuris* and *Ceratophyllum;* Ventenat, in 1799, in the ferns after *Equisetum*. The first author to separate them into a family by themselves was Richard, in the botanical account of the voyage of Humboldt and Bonpland, 1815, where they were placed between Marsileaceae and Piperaceae. Their affinity with the Algae has now long been conceded; not universally, however, as Lindley and others have placed them with the mosses, while several writers have considered them to belong to the vascular cryptogams.

As a matter of fact they do not approach very close to any other group, but probably find their nearest affinity with the Coleochaetaceae among the Chlorophyceae, and they should either be made the highest order of this group, as is done in Engler and Prantl's *Pflanzenfamilien*, or made into a separate subkingdom, as by Strasburger.

The researches which led to a correct understanding of the family were carried on by Wallroth, 1815; Vaucher, 1821; Kaulfuss, 1825;

Bischoff, 1828; Pringsheim, 1862; Nordstedt, 1865; and de Bary, 1871. Especial reference must be made to Alexander Braun, who illuminated every phase of the subject. The species were previously very imperfectly understood; many of them were aggregates of little-related forms, but his investigations laid a firm base for all future work. Unfortunately, when a former species or specific name seemed unsatisfactory to him, he promptly discarded it, dealt similarly with names given by himself, and counted mere herbarium names and casual mention as the equivalent of publication. The names adopted by him are still in general use, though in many cases they have been departed from in this paper. More recent works of taxonomic importance are by Migula upon the Characeae of Europe; by H. and J. Groves upon those of the British Isles; and by Nordstedt, whose descriptions include several American forms.

The first generic division was by Agardh in 1824, who separated *Nitella* from *Chara*, taking as the distinguishing character the absence of cortex, still often, though wrongly, so considered. The real nature of these two genera was first shown by Braun, who at a later date, separated *Lamprothamnus* from *Chara*. He also made *Tolypella* a subgenus of *Nitella;* this was raised to generic rank by von Leonhardi, in 1863, who at the same time similarly treated *Lychnothamnus*, first recognized as a section of *Chara* by Ruprecht in 1845. *Chara obtusa* Desv., placed subsequently in *Nitella* and *Lamprothamnus*, was the last of the accepted genera to receive recognition, which came from Hy in 1889, as *Nitellopsis*, and Migula in the succeeding year applied to it the name *Tolypellopsis*, which, however, as a subgenus dated back to von Leonhardi in 1863.

One other genus, *Charopsis*, to comprise uncorticated Chareae, was proposed by Kützing in 1843, with *Chara Braunii* as the type, but this character did not justify segregation, as he himself speedily saw.

The first American reference to this group dates back as far as 1696, when Sloane, in his catalogue of plants of Jamaica, identifies a plant from that island as the *Equisetum foetidum sub aqua repens* of Caspar Bauhin, already mentioned. His species was probably *C. haitensis* Turpin.

The first continental American species to be recognized was *Chara foliolosa*, sent under this name from Pennsylvania by Muhlenberg and described by Willdenow. American botanists confused

with this the widely different *C. Schweinitzii*, distributed by the collector after whom it is called. Braun was from an early date in correspondence with American collectors, especially Engelmann, and almost all publications here have been profoundly influenced by him. Dr. T. F. Allen of New York has been by far the most assiduous collector and student of the family on this side of the Atlantic; he accumulated a very large herbarium, which has made the present paper possible. He projected an extensive work, to include all American representatives of the group, but was unable to complete it. Many species were collected by Charles Wright, botanist of the Mexican Boundary survey, in 1851–2. These passed through the hands of Engelmann, Braun, and Allen, and have often been cited.

The only paper yet published, intended to comprise all North American representatives of the family, was by Halsted, in 1879. The collections upon which it was based were mainly from New England and the total was only 24: *Nitella* 8 species, *Tolypella* 1 species, and *Chara* 9 species and 6 varieties. In *Fragmente einer Monographie der Characeen*, compiled from Braun's notes by Nordstedt after the death of the former, and published in 1882, there are North American identifications under 39 specific headings, 21 in *Nitella*, 3 in *Tolypella*, and 15 in *Chara*, besides which many varieties and forms are recorded.

An important paper covering a limited range is that of Woods in the *Flora of Nebraska*, in which 5 species of *Nitella* and 7 of *Chara* are described and figured.

Synopsis of the Genera of Characeae

Crown-cells in two superimposed rows, each of 5 cells; cortex and stipulodes wanting. — Subfamily Nitelleae.

- Antheridia terminal on the primary ray and secondary divisions of the leaf. — 1. *Nitella.*
- Antheridia lateral on the nodes of the leaf, or within the base of the whorl. — 2. *Tolypella.*

Crown-cells in a single row. — Subfamily Chareae.

- Stipulodes none. — 3. *Nitellopsis.*
- Stipulodes present, sometimes reduced.
  - Sporocarps below the antheridia. — 4. *Lamprothamnus.*
  - Sporocarps between the antheridia. — 5. *Lychnothamnus.*
  - Sporocarps above the antheridia or in dioecious species on the upper side of the nodal cell of a leaflet. — 6. *Chara.*

The Chareae are alone included in the scope of this paper, and of the four genera, *Chara* is the only one so far collected in North America.

The genus, as here divided, is represented in North America by 50 species, besides many aberrant forms, some of which will doubtless be shown by further study and better material to be worthy of addition to the number. Of these 50 species, 1 is known from Greenland, 11 occur in Canada, 37 in the United States, 17 in Mexico or Central America, and 8 in the West Indies. No one species is however known from all of these divisions, and this remains true even if Braun's specific limits be accepted, in which case the nearest would be his *C. gymnopus*, which has its northern limit in Lake Champlain, is well represented in the United States and Mexico, and is much the predominant form in the West Indies and in Central America.

CHARA L. Sp. Pl. 1156. 1753

Charopsis Kütz. Phyc. Gen. 319. 1843. (Type, *Chara Braunii* C. C. Gmelin.)

Annual or perennial algae, inhabiting fresh, brackish, or salt water, usually gregarious, often fetid. Stems composed of nodes and internodes, the former bearing whorls of leaves, surrounded without by one or two whorls of stipulodes, and often having a branch in the axil of the first formed leaf of the whorl. Leaves similarly divided into nodes and internodes, with longer or shorter leaflets at the former. Sexual reproduction by antheridia and oögonia, the latter in monoecious species lying above the antheridia. Oögonium upon fertilization, or parthenogenetically, developing into a sporocarp, composed of an oöspore, surrounded by an envelope of five spiral cells, and terminating in a single row of crown-cells. Stems uncorticated or corticated, the number of cortical rows 1–3 times the number of leaves, the primary cortical cells forming nodes and internodes. Leaves also uncorticated or corticated, but all cortical cells formed from the node-cells of the leaf. Plants with or without calcareous incrustation; this is most frequent in corticated species.

Type species: *Chara vulgaris* L.

Key to the Species

Stems entirely uncorticated.

Stipulodes forming a single whorl.

Bracteoles shorter than the mature sporocarps; posterior leaflets nearly always wanting.

Stipulodes short and slender; oöspores almost always shorter than 0.5 mm. 1. *C. pallida.*

Stipulodes longer and broader; oöspores 0.5–0.6 mm. long. 2. *C. Braunii.*

Bracteoles at least as long as the mature sporocarps. 3. *C. Schweinitzii.*

Stipulodes forming a double whorl. 47. *C. Brittonii.*

Stems corticated, at least in part.

Corticated stem-internodes very incompletely covered by the cells.

Anterior bracteoles 0.1–0.3 mm. long. 8. *C. hypnoides.*

Anterior bracteoles 0.4–0.7 mm. long. 9. *C. inconnexa.*

Corticated stem-internodes completely covered by the cells, or almost so.

Stems singly corticated, or very small secondary cortical cells sometimes developed.

Stipulodes forming a single whorl; leaves entirely uncorticated. 4. *C. crinitiformis.*

Stipulodes forming a double whorl; leaves at least partly singly corticated.

Monoecious.

Oöspores with 14 or 15 striae. 5. *C. hirsuta.*

Oöspores with 10–12 striae. 6. *C. evoluta.*

Dioecious. 7. *C. canescens.*

Stems doubly corticated.

Stipulodes forming a single whorl. 16. *C. Morongii.*

Stipulodes forming a double whorl.

Primary cortical cells more prominent.

Oöspore with calcareous coating.

Primary and secondary cortical cells of nearly equal diameter. 10. *C. Schaffneri.*

Primary cortical cells wider than secondary.

Posterior bracteoles very short, or none. 11. *C. contraria.*

Posterior bracteoles not very short. 12. *C. excelsa.*

Oöspore without calcareous coating. 13. *C. baltica.*

Secondary cortical cells more prominent.

Posterior bracteoles usually twice as long as wide. 14. *C. intumescens.*

Posterior bracteoles little longer than wide, often wanting. 15. *C. vulgaris.*

Stems triply corticated, but by imperfect development of some of the secondary cells, usually appearing doubly corticated; stipulodes forming a single whorl; at least the basal leaf-internode uncorticated.

Monoecious.

Leaves entirely uncorticated.

Plants only slightly incrusted, usually light-green.

Stipulodes 0.6–1.1 mm. long.
Oöspores with 8 or 9 striae.
16. *C. Morongii.*
Oöspores with 11 or 12 striae.
17. *C. Schneckii.*
Stipulodes 1.75–3 mm. long.
Oöspores with 8 striae. 18. *C. coronatiformis.*
Oöspores with 6 striae. 19. *C. Curtissii.*
Stipulodes 3.5–8 mm. long. 20. *C. longifolia.*
Plants somewhat heavily incrusted, grayish.
21. *C. keukensis.*
Leaves more or less corticated, the basal internode excepted.
Leaves with one corticated internode.
Stipulodes 0.2–0.25 mm. long. 22. *C. mexicana.*
Stipulodes 0.8–1.1 mm. long. 17. *C. Schneckii.*
Leaves with more than one corticated internode.
Oöspores 0.4 mm. long. 23. *C. Liebmanni.*
Oöspores 0.5 mm. long. 24. *C. Robbinsii.*
Dioecious.
Spine-cells very short, confined to upper stem-internodes.
20. *C. longifolia.*
Spine-cells conspicuous on all stem-internodes.
Leaves not over 2.5 cm. long. 25. *C. Hornemannii.*
Leaves up to 8 cm. long. 26. *C. Nordhoffiae.*
Stems usually very regularly triply corticated; stipulodes forming a double whorl.
Leaves entirely uncorticated.
Posterior bracteoles not greatly reduced.
34. *C. inconstans.*
Posterior bracteoles greatly reduced. 37. *C. guatemalensis.*
Leaves, or at least the lowest leaf-internodes, doubly corticated.
Monoecious.
Oöspores brown. 27. *C. leptosperma.*
Oöspores black.
Primary and secondary cortical cells of equal size; no spine-cells, papillae rare. 28. *C. fragilis.*
Primary cells larger than secondary; spine-cells or at least papillae present. 29. *C. verrucosa.*
Dioecious.
Spine-cells well developed; posterior leaflets moderately developed. 30. *C. aspera.*
No spine-cells; posterior leaflets greatly reduced.
31. *C. Macounii.*
Leaves, at least some of them, triply corticated, at least in part; the lowest leaf-internode always uncorticated.
Antheridia and oögonia borne at the same nodes.
Leaflets at the lowest leaf-node linear to ovate, not ventricose, similar to the others.

Some or all leaflets well developed.
Lowest leaf-internode 2–6 times as long as broad.
Posterior bracteoles little reduced, longer than sporocarps.
Spine-cells inconspicuous.
32. *C. cubensis.*
Spine-cells conspicuous.
33. *C. elegans.*
Posterior bracteoles considerably reduced, shorter than sporocarps.
Corticated leaf-internodes 3 or fewer.
34. *C. inconstans.*
Corticated leaf-internodes 4 or more.
Slightly incrusted.
Stipulodes at least as long as the basal leaf-internode.
Posterior bracteoles not very short.
35. *C. filicaulis.*
Posterior bracteoles often very short.
36. *C. fertilissima.*
Stipulodes shorter than the basal leaf-internode. 38. *C. carmenensis.*
Heavily incrusted.
39. *C. Hicksii.*
Lowest leaf-internode only slightly longer than broad.
Posterior bracteoles only slightly reduced; striae on oöspore 10 or 11. 40. *C. stellata.*
Posterior bracteoles half length of anterior; striae on oöspore 14 or 15. 41. *C. Sanctae-margaritae.*
Posterior bracteoles much less than half length of anterior. 42. *C. foliolosa.*
All leaflets at sterile nodes greatly reduced.
43. *C. haitensis.*
Leaflets at the lowest leaf-node ventricose, usually different from the others.
Leaflets at sterile nodes not very short, 0.16 mm. or more.
44. *C. conjungens.*
Leaflets at sterile nodes not exceeding 0.16 mm.
Striae upon oöspore 8–10. 45. *C. indica.*
Striae upon oöspore 12–14.
46. *C. trichacantha.*
Antheridia and oögonia borne at different nodes of the same leaves.
Anterior bracteoles longer than the sporocarps.
48. *C. formosa.*
All bracteoles shorter than the sporocarps.
Upper whorl of stipulodes 0.56–0.82 mm. long, concealing the uncorticated basal leaf-internode.
49. *C. sejuncta.*

Upper stipulodes 0.92–1.5 mm. long, but not concealing the uncorticated basal leaf-internode.
50. *C. compacta.*

1. **Chara pallida** sp. nov.

C. coronata Braunii forma *novi-mexicana* A. Br. Fragm. Monogr. Char. 111. 1882.

C. coronata Braunii tenera A. Br.; Allen, Am. Nat. **16**: 361. 1882.

C. coronata gracilis Allen, Am. Nat. **16**: 362. *pl. 4.* 1882.

Monoecious: 5–20 cm. high, totally unincrusted, or sometimes partially incrusted, then having a mottled appearance; entirely without cortication and therefore without spine-cells; stems 0.6–1 mm. in diameter: stipulodes forming a single whorl at each node, alternate with and equal in number to the leaves, sometimes inconspicuous, 0.25–0.75 mm. long, 0.07–0.1 mm. wide: leaves 7–10 in a whorl, 6–25 mm. long, containing 3–5 internodes besides the terminal cell; leaflets at sterile nodes usually very small, the bracteoles much shorter than or rarely nearly equaling the sporocarps, 0.3–0.9 mm. long, 0.05–0.1 mm. wide, the posterior very short or more often wanting: antheridia 0.26–0.32 mm. in diameter; sporocarps single or in pairs, 0.7–1 mm. long, 0.4–0.48 mm. wide; oöspores 0.42–0.52 mm. long, 0.31–0.35 mm. wide, with 5–7 rather coarse and prominent striae; whorl of crown-cells 0.12–0.21 mm. high, 0.2–0.25 mm. wide at base, the individual cells ovate or subhemispherical with a peaked apex, or subpyriform.

Type collected at Silver City, New Mexico, by H. H. Rusby, 1880; in the herbarium of the New York Botanical Garden.

Distribution: New Mexico to central Mexico.

Illustrations: Am. Nat. **16**: 362. *f. 1; pl. 4.*

Exsiccatae: Allen,Char. Am. Exsicc. *11.*

2. Chara Braunii C. C. Gmelin, Fl. Bad. Alsat. **4**: 646. 1826

C. coronata Ziz; Bisch. Krypt. Gewäch. 26. 1828.

C. coronata Braunii A. Br. Flora **18**: 60. 1835.

Charopsis Braunii Kütz. Phyc. Gen. 319. 1843.

Monoecious: 6–20 cm. high, without incrustation, cortex, or spine-cells: stipulodes forming a single whorl at each node, alternate with and equal in number to the leaves, mostly 0.4–0.8 mm. long and 0.17–0.21 mm. wide, but varying, even on a single plant: leaves 10–12 in a whorl, 1.2–1.8 mm. long, composed of 4 or 5 internodes, besides the short terminal cell; leaflets at sterile nodes up to 0.4 mm. long, or entirely wanting; bracteoles 0.5–0.9 mm. long, 0.08–0.2 mm. wide, the posterior very rarely developed, all

shorter than the sporocarps: sporocarps 0.7–0.84 mm. long, 0.45–0.53 mm. wide; oöspores 0.5–0.6 mm. long, 0.35–0.4 mm. wide, with 6 or 7 striae; whorl of crown-cells 0.1–0.16 mm. high, 0.2–0.23 mm. wide at base, the individual cells lanceolate to ovate, usually connivent.

Type locality: Carlsruhe, Baden, Germany.

Distribution: Vermont to Minnesota and Indian Territory; Europe, Asia, and Africa.

Illustrations: Am. Nat. **16**: 362. *f. 2*; 367. *f. 9*; Bisch. Krypt. Gewäch. *pl. 1*, *f. 5*, as *C. Braunii*; *loc. cit. f. 7*, as *C. coronata*; Kütz. Tab. Phyc. **7**: *pl. 43*, *f. a–e*; Migula, Char. Deutsch. Oesterr. Schw. *f. 81–83*; Migula, Consp. Char. Eur. *f. 68*, *69*; Woods, Flor. Neb. **1**: *pl. 30. f. 1*, *4*.

Exsiccatae: Allen, Char. Am. Exsicc. *12*.

The common American species of this group is *C. Schweinitzii*, typical specimens of which are quite distinct from the European *C. Braunii* in several important characters. There are also puzzling intermediate forms, but most of these are referable to *C. Schweinitzii*, to which also belong several of the plants placed by Braun and Allen under *C. Braunii*. There remain a few of northern distribution which seem practically identical with European specimens. The southern hitherto assigned to this species are here somewhat tentatively separated.

3. Chara Schweinitzii A. Br. Ann. Sci. Nat. II. **1**: 353. 1834

C. coronata Schweinitzii A. Br. Flora **18**: 60. 1835.

C. Braunii foliolosa Wallm. Kongl. Vet.-Akad. Handlingar **1852**: 286. 1854.

Monoecious: variable in size and habit, 0.1–1.5 m. high, 0.7–1.3 mm. in diameter, usually cespitose, bright- to olive-green, entirely unincrusted or much more rarely lightly or heavily incrusted, never corticated, and therefore without spine-cells: stipulodes forming a single whorl at each node, alternate with and equal in number to the leaves, usually 1.5–3.5 mm. long, and about 0.5–1.5 mm. wide: leaves 8–11 in a whorl, 0.8–5 cm. long, usually exceeding the corresponding stem-nodes, containing 4–6 internodes, besides the short terminal cell; leaflets usually verticillate, the posterior shorter but nearly always developed, the anterior bracteoles 1.3–2.5 mm. long, slightly exceeding to three times as long as the sporocarps, those at sterile nodes usually much shorter, often very small: antheridia and oögonia single or in pairs, the former 0.28–0.32 mm. in diameter; mature sporocarps 0.8–0.92 mm. long, 0.49–0.53 mm. wide; oöspores 0.52–0.65 mm. long, 0.33–0.4 mm. wide, with 9–11 striae;

whorl of crown-cells 0.15–0.18 mm. high, 0.2–0.25 mm. wide at base, the individual cells pyriform.

Type locality: North Carolina.

Distribution: Quebec and Florida to British Columbia and California.

Illustrations: Am. Nat. **16**: 364. *f. 5;* 365. *f. 6* (?); 366. *f. 7, 8;* Allen, Char. Am. *pl. 3;* Woods, Flor. Neb. **1**: *pl. 30. f. 2, 3, 5–7.*

Exsiccatae: Allen, Char. Am. Exsicc. *8, 13, 14;* Tilden, Am. Alg. *256, 529;* Collins, Holden, & Setchell, Phyc. Bor. Am. *822.*

This species was originally based upon material sent to Europe by Schweinitz, wrongly labeled *C. foliolosa* Muhl., which is very different. A sheet so named in his handwriting, now in the herbarium of the New York Botanical Garden, is however a *Nitella*, while another labeled by him *C. nidifica* is *C. Schweinitzii.*

4. **Chara crinitiformis** sp. nov.

C. excelsa Allen, Bull. Torrey Club **9**: 43. *pl. 20*, in part. 1882.

Probably dioecious, but only maturing sporocarps have been seen: about 10 cm. high, without calcareous incrustation; stems 0.7 mm. in diameter, regularly singly corticated; spine-cells frequent, usually in pairs, rigid, 1.2–1.6 mm. long, 0.16–0.2 mm. wide, very acute and sometimes falcate at the apex: stipulodes forming a single whorl at each node, twice as numerous as the leaves, similar to the spine-cells: leaves 10–12 in each whorl, 6–8 mm. long, entirely uncorticated; lower leaflets similar to one another and to the stipulodes, the upper somewhat shorter and wider: sporocarps 0.8–0.85 mm. long, 0.62–0.73 mm. wide; oöspores globose, yellowish, mostly 0.47–0.51 mm. long and 0.47 mm. broad, but one presumably more mature 0.63 mm. long and 0.56 mm. wide, 7-striate; whorl of crown-cells depressed-hemispheric, 0.1–0.13 mm. high, 0.23–0.29 mm. wide at base.

Type collected at Canadaigua Lake, New York, by T. F. Allen, August, 1881; in the herbarium of the New York Botanical Garden.

Distribution: Only known from type collection.

Illustration: Bull. Torrey Club **9**: *pl. 20, f. A.*

Exsiccatae: *C. excelsa* Allen was distributed in his Char. Am. Exsicc. as *no. 15*, and small quantities of this were doubtless included, as the specimen here described was obtained from undistributed material of that number. *C. excelsa* in all the more important characters belongs to the *contraria* group, but some portions of the description were based on *C. crinitiformis.*

5. Chara hirsuta Allen, Bull. Torrey Club **27**: 301. *pl. 10, 11.* 1900

Monoecious: 0.5–0.6 m. high, moderately incrusted; stems 0.26–0.62 mm. in diameter, singly corticated, the primary cells almost or completely covering the stem except in the youngest internodes, very small secondary cortical cells rarely developed; spine-cells often forming whorls around the stem, single or more often paired, and then usually unequal, variable, 0.25–1.7 mm. long, 0.05–0.11 mm. wide at base; lower internodes of the stem usually 1.5–2 cm., but reaching 6 cm. in length, the apical 3 or 4 together usually not exceeding 1 cm. in length: stipulodes forming a double whorl at each node, comparatively short, those in the upper whorl 0.38–0.56 mm. long, 0.035–0.05 mm. wide, those in the lower 0.26–0.37 mm. long, 0.03–0.04 mm. wide: leaves 10–12 in a whorl, 7–11 mm. long, containing 5 or 6 internodes, very slender, rarely more than 0.2 mm. in diameter at their bases, and little more than half this near their apices, cortex single, completely covering the leaves or leaving irregular, elongated interstices; leaflets 6–8 at the sterile nodes, forming a similar whorl at the apex, 0.4–1.4 mm. long, 0.07–0.09 mm. wide, the bracteoles attaining a length of 1.7 mm., all bracteoles exceeding the mature sporocarps, the anterior the longest: antheridia 0.3–0.35 mm. in diameter; sporocarps 0.84–1 mm. long, 0.31–0.37 mm. wide; oöspores 0.63–0.68 mm. long, 0.23–0.25 mm. wide, truncate at both ends, with 14 or 15 striae; whorl of crown-cells about 0.09 mm. high, 0.18 mm. wide at base, the individual cells nearly square, but with rounded angles.

Type locality: Lakeside, San Diego County, California.

Distribution: Only known from type locality.

Illustrations: Bull. Torrey Club *loc. cit.*

Exsiccatae: Allen, Char. Am. Exsicc. *11a.*

6. Chara evoluta Allen, Bull. Torrey Club **9**: 41. *pl. 19.* 1882

Monoecious: (1 cm. *fide* Allen) 7–15 cm. high, very slightly incrusted; stems 0.125–0.525 mm. in diameter, singly corticated, the cortical node-cells nearly but not always forming secondary cells, which in rare cases develop into secondary cortical cells; spine-cells single, in pairs, or in threes, often forming whorls around the stem, linear or linear-lanceolate, 0.3–1.6 mm. long, 0.08–0.16 mm. wide: stipulodes forming a double whorl at each node, somewhat variable, linear, those in the upper whorl 0.5–1 mm. long, 0.07–0.09 mm. wide, those in the lower whorl one-half to two-thirds of this length: leaves 9 or 10 in each whorl, 4–6 mm. long, 0.2–0.27 mm. wide, containing 4 or 5 singly corticated internodes, and an uncorticated one- or two-celled tip; leaflets unequal or nearly equal, but all developed, 0.45–1.4 mm. long, those at the fertile similar to those at the sterile

nodes, except that the former often have a short additional leaflet or pre-bracteole on each side of the oögonium, as in *C. canescens*, these usually 0.25–0.4 mm. long: antheridia 0.31–0.34 mm. in diameter; mature sporocarps 0.72–0.88 mm. long, 0.4–0.5 mm. wide; oöspores oval, 0.58–0.68 mm. long, 0.33–0.37 mm. wide, with 10–12 inconspicuous striae; whorl of crown-cells 0.1–0.14 mm. high, 0.2–0.22 mm. wide at base, the individual cells somewhat connivent or becoming spreading, apparently easily deciduous.

Type locality: Red Deer Lakes and ponds west of the Saskatchewan, Alberta.

Distribution: Alberta to South Dakota and California.

Illustrations: Bull. Torrey Club *loc. cit.;* Woods, Flor. Neb. 1: *pl. 34.*

Exsiccatae: Allen, Char. Am. Exsicc. *16.*

7. Chara canescens Loisel. Not. Fl. France 139. 1810

C. crinita Wallr. Annus Bot. 190. 1815. — Allen, Bull. Torrey Club **2**: 10. 1871; **9**: 40. *pl. 18.* 1882. — Halsted, Proc. Boston Soc. Nat. Hist. **20**: 181. 1879. — A. Br. Fragm. Monogr. Char. 137. *pl. 7. f. 221, 222.* 1882.

C. crinita americana Allen, Char. Am. *pl. 2.* 1879; 5. *pl. 2.* 1880.

Dioecious, antheridia very rare on European specimens, and as yet unknown on American: 6–15 cm. high, dark-green, or becoming yellowish-green when dry, only rarely incrusted, and then but slightly; stems 0.28–0.44 mm. in diameter, singly corticated, the cortical cells usually short and parallel to the direction of the stem, the cortical node-cells normally bearing three spine-cells, 0.4–1.6 mm. long, 0.07–0.09 mm. wide, obtuse to subacute at the apex, often hiding the stem, much more rarely somewhat distant: stipulodes forming a double whorl at each node, those in the upper whorl 0.48–0.75 mm. long, 0.07–0.09 mm. wide, those in the lower equally wide but only 0.25–0.53 mm. long: leaves 8–10 in each whorl, 5–8 mm. long, singly corticated, except the uncorticated tip, which resembles the ultimate whorl of leaflets by which it is surrounded; leaflets and bracteoles similar to one another, 0.5–1.4 mm. long, usually 6 in number, with two between which the sporocarp is situated much smaller than the others, becoming at the extreme reduction only one-fourth the length of the mature sporocarps: sporocarps 0.7–0.84 mm. long, 0.42–0.5 mm. wide; oöspores elliptic or obovate-elliptic 0.53–0.63 mm. long, 0.31–0.38 mm. wide, with 9–11 striae; whorl of crown-cells 0.08–0.09 mm. high, 0.13–0.18 mm. wide at base, the individual cells connivent or slightly spreading.

Type locality: Toulon, France.

Distribution: Massachusetts to Long Island; Europe, Asia, and Africa.

Illustrations: Bull. Torrey Club *loc. cit.;* A. Br. Fragm. Monogr. Char. *loc. cit.;* Kütz. Tab. Phyc. 7: *pl. 69. f. 1;* Migula, Char. Deutsch. Oesterr. Schw. *f. 87–90;* Migula, Consp. Char. Eur. *f. 73–75;* E. & P. Natürl. Pflanzenfam. *f. 128;* Allen, Char. Am. *loc. cit.*

8. **Chara hypnoides** sp. nov.

Monoecious, the antheridia and oögonia probably always borne upon the same leaf-nodes: 3–5 cm. high, cespitose, not incrusted; stems 0.3–0.45 mm. in diameter, the lowest internodes entirely uncorticated, the upper internodes either singly corticated, with the cells incompletely covering the stem, or with secondary cells more or less developed, but the primary the more projecting, and the stem nearly or completely covered; spine-cells wanting, but the cortical node-cells sometimes forming oval to depressed-globose papillae, 0.03–0.1 mm. long: stipulodes often inconspicuous, forming a double whorl at each node, the number in each whorl twice that of the leaves, those in the upper whorl oval, 0.09–0.13 mm. long, those in the lower oval to globose, 0.05–0.1 mm. long: leaves 6–8 in a whorl, often entirely uncorticated and then usually 3-celled and not developing nodes and internodes, or uncorticated but forming nodes and internodes, or the first one, two, or three internodes singly corticated, the cortex-cells in contact with one another laterally or more or less separated, terminal leaf-cells sometimes only 0.1 mm. long, ovate; leaflets at the sterile nodes reduced to papillae, or the anterior fascicled and attaining a length of 0.4 mm.; anterior bracteoles 0.1–0.3 mm. long, shorter than the sporocarps at any stage, the lateral and posterior bracteoles still shorter, not exceeding 0.175 mm., usually less: antheridia early deciduous, 0.32–0.37 mm. in diameter; the oögonia and sporocarps often in pairs, the latter (probably not quite mature) observed up to 0.63 mm. long 0.4 mm. wide, the oöspores up to 0.44 mm. long and 0.37 mm. wide, with 8 striae, the crown-cells 0.07–0.14 mm. high, ovate-globose.

Type collected in shallow water in the crevices of rocks, along the borders of an island on the east side of Lake Nipigon, Ontario, by John Macoun, *no. 6*, July 16, 1884; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

A distinct and very curious species, placed by Dr. Allen near the dioecious *C. imperfecta* A. Br. from Algeria; probably even closer to European specimens of *C. dissoluta* A. Br.; with important resemblances to and sharp distinctions from both.

9. Chara inconnexa Allen, Bull. Torrey Club 9 : 40. *pl. 17.* 1882

Monoecious, the antheridia and the oögonia at the same leaf-nodes : 3.5–4.5 cm. high, moderately incrusted; stems 0.17–0.37 mm. in diameter, entirely uncorticated below, above singly corticated, the cells not adjoining laterally, and therefore not completely covering the stem, secondary cortical rows not developed, though minute cells are sometimes seen on either side of the cortical node-cells; spine-cells entirely wanting : stipulodes oval to globose, small and inconspicuous, 0.07–0.11 mm. long, forming a double whorl at each node, the number in each whorl twice that of the leaves, or compressed into a single whorl, or entirely wanting : leaves 7 or 8 in a whorl, 1–2 cm. long, those at the lowest node uncorticated, nitelloid, not forming nodes and internodes, usually composed of two long cells and a much shorter terminal one ; leaves in the upper whorls sometimes naked, or partly doubly corticated or partly singly corticated like the stem, or both ; no leaflets found at sterile nodes, probably there are none ; anterior bracteoles 0.4–0.7 mm. long, much shorter than the mature sporocarps : antheridia 0.25–0.33 mm. in diameter ; mature sporocarps 0.9–1.1 mm. long, 0.56–0.6 mm. wide ; oöspores 0.54–0.6 mm. long, 0.4–0.42 mm. wide, with 8–10 striae ; crown-cells each about 0.09 mm. high and 0.12 mm. wide, somewhat truncate.

Type locality : Storm Lake, Iowa.

Distribution : Only known from original collection.

Illustration : Bull. Torrey Club *loc. cit.*

10. Chara Schaffneri A. Br. Fragm. Monogr. Char. 146. 1882 ; as subspecies

Monoecious : resembling in habit *C. fragilis pulchella*, but differing very widely from it in the nature of the cortex and spine-cells, and approaching nearest to *C. tenuispina*, but seems to differ from it by being doubly corticated, color varying from bright- or golden-green to dark-green, incrustation slight ; stems 0.5–0.6 mm. in diameter, doubly corticated, partition walls of the secondary cells at right angles to their length, rarely slanting ; spine-cells single, scattered, projecting horizontally, or in the upper part of the internode weak, sloping downwards, conical, very sharp, 0.06–0.14 mm. long, at the base 0.05–0.06 mm. wide (Braun's description reads "1.05–6 mm.," supposed to be a misprint for preceding) : stipulodes forming a double whorl at each node, more strongly developed than in *C. fragilis*, those in the upper whorl somewhat longer than those in the lower, appressed respectively to the leaves and the stem : leaves 9 or most often 10 in a whorl, 0.4–1.2 cm. long, ascending and straight, or slightly incurved, or the tip occasionally squarrose, about 0.18 mm. in diameter, containing 4–6, usually 5,

corticated internodes of almost equal length, the basal internode neither shortened nor uncorticated, and a 1- or 2-celled uncorticated leaf-tip, which is somewhat shorter than, or sometimes as long as, the last corticated internode; 10 (on upper) to 14 (on lower internodes) cortical cells seen in a cross-section of the leaf; leaflets present at all corticated nodes, as bracteoles the anterior mostly 4 in number, elongated, 1½–2 times as long as the sporocarps, 0.07–0.11 mm. in diameter, the 3 or 4 posterior much shorter, conical: antheridia 0.24 mm. in diameter; sporocarps oblong, 0.6–0.64 mm. long, 0.32–0.35 mm. wide; oöspores dark-brown, 0.46 mm. long, 0.3 mm. wide; crown-cells rather short and blunt, sometimes connivent, sometimes slightly diverging, 0.07–0.1 mm. high, 0.14 mm. wide.

Type locality: Valley of Mexico.

Distribution: Mexico.

11. Chara contraria A. Br.; Kütz. Phyc. Germ. 258. 1845

Monoecious: 10–50 cm. high, lightly or more often heavily incrusted, and accordingly ranging in color from bright-green to gray; stems 0.4–0.9 mm. in diameter, normally doubly corticated, with the primary cortical rows projecting beyond the secondary, or less often rows of both orders nearly equally prominent, or by the ends of the secondary cells overlapping becoming in part triply corticated; spine-cells conspicuous only on the uppermost internodes, 0.09–0.63 mm. long, ranging to mere papillae on the mature internodes: stipulodes forming a double whorl at the nodes, usually very small and inconspicuous, or sometimes more or less compressed into a single whorl, or corresponding stipulodes of the upper and lower whorl not situated directly above one another: leaves 6–10 in a whorl, 0.5–3 cm. long, sometimes entirely uncorticated, or more often with 1–5 corticated internodes, and an uncorticated 1–5-celled leaf-tip; leaflets usually very short, rarely reaching 0.6 mm. long, the anterior nearly always the longer; anterior bracteoles 0.6–3 mm. long, posterior most often reduced to papillae, sometimes entirely wanting, rarely up to 0.35 mm. long: antheridia and oögonia rarely in pairs, found not only at nodes between corticated internodes or at the node terminating the corticated portion of the leaf, but also at nodes where the internodes both above and below are uncorticated; antheridia 0.3–0.58 mm. in diameter; sporocarps 0.88–1.1 mm. long, 0.5–0.65 mm. wide; oöspores black or dark-brown, 0.6–0.72 mm. long, 0.35–0.49 mm. wide, with 10–13 striae; whorl of crown-cells 0.12–0.16 mm. high, 0.22–0.28 mm. wide at base, the individual cells oblong, rounded at the apex, erect but not connivent.

Type locality: Germany.

Distribution: Quebec and Alaska to Mexico; Europe, Asia, Africa, and Australia, according to Braun.

Illustrations: Kütz. Tab. Phyc. **7**: *pl. 61;* Jour. Bot. **19**: *pl.*

224. f. 2–2c; Migula, Char. Deutsch. Oesterr. Schw. *f. 99–104;* Migula, Consp. Char. Eur. *f. 84–89;* Woods, Flor. Neb. 1 : *pl. 31.*

Exsiccatae : Allen, Char. Am. Exsicc. *4–6*, *19;* Tilden, Am. Alg. *121;* Collins, Holden, & Setchell, Phyc. Bor. Am. *1197.*

12. CHARA EXCELSA Allen, Bull. Torrey Club 9 : 43. *pl. 20.* 1882

Species inquirenda; as originally described a curious mixture, the most diverging component separated here as *C. crinitiformis;* the more important parts of the original description taken from, and almost all the herbarium material composed of, two forms, both possibly reducible to *C. contraria*, but requiring further collections : monoecious : 6–14 cm. high, grayish from the somewhat heavy incrustation; stems 0.2–0.62 mm. in diameter, mostly regularly doubly corticated, with the primary cells of greater diameter and more prominent, or with the ends of two secondary cells intervening between consecutive primary rows, or with some internodes entirely uncorticated; spine-cells 0.12–0.24 mm. long or reduced to papillae : stipulodes forming a double whorl at the nodes, those in the upper whorl 0.09–0.61 mm. long, those in the lower 0.12–0.32 mm. long, or wanting entirely at nodes intervening between uncorticated internodes; leaves 7 or 8 in a whorl, 0.8–3.2 cm. long, containing usually 3 or 4 doubly corticated internodes, with an uncorticated 2- or 3-celled leaf-tip, the longest leaves with only one corticated internode and an uncorticated 5-celled leaf-tip, or some leaves entirely uncorticated but still fertile; leaflets or at least the posterior extremely variable, as bracteoles the anterior 1.1–2.15 mm. long, usually far exceeding the sporocarps, the posterior bracteoles 0.1–0.8 mm. long : antheridia 0.32–0.35 mm. in diameter; sporocarps 0.8–1.05 mm. long, 0.44–0.6 mm. wide; oöspores 0.54–0.75 mm. long, 0.38–0.44 mm. wide, these figures imperfectly representing the facts, as the shortest set of oöspores belongs to the longest sporocarps, the anomaly being due to the abnormal prolongation of the neck, the crown-cells being 0.2–0.25 mm. high; oöspores with 11–15 striae.

Type locality : Canadaigua Lake, New York.

Distribution : Only known from original collection.

Illustration : Bull. Torrey Club *loc. cit.* excl. *f. A.*

Exsiccatae : Allen, Char. Am. Exsicc. *15.*

Many of the most glaring discrepancies of this description are due to the difference between the two forms, but not all, as great variation may occur upon a single leaf. Both forms may be abnormal, and the species, even with *C. crinitiformis* excluded, is of very doubtful value.

Chara intermedia A. Br. (not the oldest name) has been reported from America by several authors, and many sheets so named are in the Allen herbarium, the range thus assigned being from Maine, Quebec, and Alaska, to New Jersey, Texas, Mexico, Southern California, and even Chile. A careful examination of every determinable sheet so named in the Allen herbarium has enforced a profound conviction that this species is not found in America. The true *C. intermedia* should be characterized, as distinguished from *C. contraria,* by better developed stipulodes and spine-cells, by having all the leaflets at sterile nodes nearly equally developed, and the posterior at fertile nodes not greatly reduced; the oöspores should be dark-brown, 0.66–0.82 mm., very rarely under 0.7 mm. long, 11-striate. The American plants usually have inconspicuous stipulodes; spine-cells are extremely rare; the leaflets can very rarely be considered equal, and then only when all are very small; the posterior bracteoles are greatly reduced; repeated measurements of oöspores, apparently fully mature and from widely separated localities, gave lengths from 0.51–0.665 mm., mostly 0.58–0.65 mm., only two getting within the minimum limits for the species. They are, moreover, much more slender than the European plants. On the contrary, so far as can be judged from dried material, the plants have the pinkish-green color of *C. intermedia*, the oöspores are dark-brown and never have the sooty color so common in *C. contraria*, and there are 11 or 12 striae. None of the three collection numbers doubtfully assigned to this continent by Braun have been seen, but from his description, and the examination of plants undoubtedly similar from kindred localities, it is believed they also are to be excluded from the species. It is hard to believe that they really represent *C. contraria*, but that is certainly their nearest affinity, and they are so placed for the present.

C. hispida L. is reported from New York State, but no American material so assignable has been seen, and it is not here included.

13. Chara baltica (Hartm.) Fries & Asp.; Bruz. Obs. Gen. Char. 11, 19. 1824

C. hispida baltica Hartm. Handb. Skand. Fl. 376. 1820.

Monoecious: marine, or in brackish water, 2–90 cm. high, not visibly incrusted; stems mostly 0.6–0.8 mm. but reaching 1.5 mm. in diameter, with typical double cortication, the primary cortical rows projecting somewhat beyond the secondary; spine-cells numerous on all stem-internodes, borne singly, or in fascicles of 2–4, of

variable size and shape, at the extreme their length greater than the diameter of the stem: stipulodes forming a double whorl at each node, well developed, resembling the spine-cells, those in the upper whorl generally somewhat longer than those in the lower: leaves 8–11 in a whorl, 0.5–10 cm. long, containing 5–7 internodes, doubly corticated except usually one, more rarely 2 or even 3 terminal internodes, which are uncorticated, the leaf-tip 1–3-celled; leaflets variable, at sterile nodes the posterior not or only slightly shorter than the rest, as bracteoles the lateral the longest, ranging from less than the length of the sporocarps to ten times the length of the latter, the posterior from mere papillae to almost the length of the anterior: antheridia 0.5–0.8 mm. in diameter, rarely less than 0.55 mm.; sporocarps large, ovate to ovate-globose, with a maximum length of 1.3 mm. and width of 0.8 mm.; oöspores without calcareous coating, black or brownish-black, 0.7–0.86 mm. long, 0.45–0.5 mm. wide, with 11–14 striae; whorl of crown-cells about 0.24 mm. high, 0.22 mm. wide, the individual cells oblanceolate.

Type locality: Scandinavia.

Distribution: Greenland; shores of the Baltic and England. Braun says that the Greenland plant has greatly elongated internodes, short leaves, and small spines.

Illustrations: Kütz. Tab. Phyc. **7**: *pl. 63. f. 2*, *pl. 64. f. 1*; Jour. Bot. **19**: *pl. 224. f. 1–1c*; A. Br. Fragm. Monogr. Char. *pl. 7. f. 232*; Migula, Char. Deutsch. Oesterr. Schw. *f. 114–117*; Migula, Consp. Char. Eur. *pl. 99–102*.

14. **Chara intumescens** sp. nov.

C. foetida crassicaulis Halsted, Proc. Boston Soc. Nat. Hist. **20**: 187. 1879.

C. crassicaulis Woods, Flor. Neb. **1**: 127. *pl. 33*. 1894. Not *C. crassicaulis* Schleicher.

Monoecious: very similar in habit and closely allied to *C. crassicaulis*, 12–35 cm. high, dull- or slightly brownish-green, fragile, heavily incrusted; stems 0.63–1.25 mm. in diameter, doubly corticated, the secondary cortical rows more prominent than the primary, but all of nearly equal diameter, 0.08–0.15 mm., in young internodes occasional cell-ends slipping past one another interpose two secondary cells between consecutive primaries but for a short distance only; the cortical node-cells bearing spine-cells 0.13–0.35 mm. long, less often papillae only, or in a Mexican plant spine-cells 0.35–1.7 mm. long: stipulodes forming a double whorl, but somewhat variable in length even at a single node, those in the upper whorl 0.21–0.49 mm. long, those in the lower 0.16–0.45 mm. long: leaves 6–10, usually 9 in a whorl, 0.9–1.5 cm. long, containing sometimes 1, usually 2 or 3, rarely 4, doubly corticated internodes,

followed by an uncorticated 2–4-celled leaf-tip which is not divided into nodes and internodes, the lowest of the uncorticated cells usually 0.5–0.66 mm. wide, usually exceeding the corticated leaf-internodes or even in the upper stem-internodes the diameter of the latter, or sometimes the leaves entirely uncorticated; no leaflets or reproductive organs borne except where at least the internode next below is corticated; the anterior bracteoles very rarely shorter than, usually exceeding, more often greatly exceeding the sporocarps, 1.1–2.4 mm. long, 0.1–0.32 mm. wide, the longer usually also the wider, posterior bracteoles 0.12–0.33 mm. long, 0.06–0.1 mm. wide, varying from only slightly longer to nearly four times as long as wide: antheridia 0.4–0.53 mm. in diameter; sporocarps 0.96–1.1 mm. long, 0.54–0.6 mm. wide; oöspores 0.56–0.63 mm. long, 0.39–0.44 mm. wide, with 10–13 striae; whorl of crown-cells 0.15–0.19 mm. high, 0.25–0.3 mm. wide at base, the individual cells oblong-ovate or suborbicular, truncate at the apex, usually slightly spreading.

Type collected in a saline marsh, fed by water from a sulphurous spring, Garfield Beach, Great Salt Lake, Utah, by P. A. Rydberg and E. C. Carlton, *no. 6919*, July 15, 1905; in the herbarium of the New York Botanical Garden.

Distribution: Gaspé; N. W. Canada (without definite locality) to Mexico. Some Ontario collections are doubtfully referred here, but may barely possibly be the true *C. crassicaulis*.

Illustration: Woods, Flor. Neb. *loc. cit.*

15. Chara vulgaris L. Sp. Pl. 1156. 1753

C. foetida A. Br. Ann. Sci. Nat. II. 1: 354. 1834.

Monoecious: of varied habit, 4–40 cm. high, bright-, pale-, or brownish-green, lightly or somewhat heavily incrusted, as a rule exceptionally fetid even for the genus; stems 0.5–1.2 mm. in diameter, doubly corticated, the secondary cortical rows somewhat wider and more prominent than the primary, the cortical node-cells forming small papillae or very rarely short spine-cells: stipulodes forming a double whorl at each node, but very slightly developed, usually inconspicuous, about 0.1–0.15 mm. long, less often reaching 0.25 mm., those in the upper whorl often slightly longer than those in the lower: leaves 6–11 in a whorl, 0.8–3 cm. long, containing 1–4, usually 3 or 4, corticated internodes, and an uncorticated 1–5-, usually 3- or 4-celled leaf-tip, the leaves in the lowest whorl and sometimes elsewhere uncorticated, but then without differentiation into nodes and internodes; antheridia, oögonia, and leaflets borne only where at least the preceding internode is corticated; the anterior bracteoles most frequently 4, sometimes shorter than the sporocarps, but usually very much longer, 0.8–4.5 mm. long, the posterior very small, ovate or orbicular, 0.08–0.11 mm. in length and nearly or quite of equal

width, or entirely wanting: antheridia 0.25–0.55 mm. in diameter; sporocarps 0.75–1.1 mm. long, 0.45–0.6 mm. wide; oöspores light-brown to black, 0.42–0.63 mm. long, 0.28–0.42 mm. wide, with 10–14 striae; whorl of crown-cells 0.1–0.2 mm. high, 0.21–0.28 mm. wide at base, the individual cells oblong, erect.

Type locality: Europe.

Distribution: Very widely distributed throughout North America, though with a more southern range than *C. fragilis*, and apparently not in the West Indies. Nearly cosmopolitan; the commonest of all species of *Chara*.

Illustrations: Bauhin, Prodr. ed. 2. 25. *f.*; Schnitzl. Iconogr. Fam. *pl. 4*; Kütz. Tab. Phyc. 7: *pl. 58. f. 1*; *pl. 59*; *pl. 60. f. 1*; J. E. Smith, Engl. Bot. 5: *pl. 336*; Ganterer, Oesterr. Char. *pl. 2. f. 13*; Jour. Bot. 18: *pl. 208. f. 8*; Migula, Char. Deutsch. Oesterr. Schw. *f. 121–126*; Migula, Consp. Char. Eur. *f. 106–111*; Woods, Flor. Neb. 1: *pl. 32*.

Exsiccatae: Allen, Char. Am. Exsicc. *17*, *18*; Tilden, Am. Alg. *120*, *254*, *369*.

The American representatives of this species seem to have larger antheridia and sporocarps than the European. The minimum dimensions for these organs given above were taken from Migula.

16. Chara Morongii sp. nov.

Monoecious: 4–5 cm. high, yellowish-green to dull-green, very slightly incrusted; stems 0.26–0.38 mm. in diameter, with very irregular cortication, the primary cortical node-cells usually forming secondary cells on one side only, leaving uncorticated spaces sometimes of regular but more often irregular outline, or more rarely no secondary cells formed; the cortex usually appearing double, or more rarely triple or single; spine-cells linear-lanceolate, lanceolate, or triangular, 0.1–0.35 mm. long, 0.05–0.08 mm. wide, mostly acute at the apex: stipulodes forming a single whorl at each node, twice as many as the leaves, 0.6–1 mm. long, 0.1–0.12 mm. wide, linear-lanceolate, acute at the apex: leaves 6 or 7 in each whorl, 2–4 mm. long, containing 2–4 internodes besides the terminal cell, entirely uncorticated, about 0.15–0.25 mm. in diameter; leaflets nearly equal, very similar to the stipulodes, 0.7–0.9 mm. long, 0.12–0.14 mm. wide, acute or rarely obtuse at the apex, as bracteoles nearly twice the length of the sporocarps: antheridia 0.23–0.26 in diameter; sporocarps, probably immature, nearly spherical apart from the crown-cells, the largest 0.42 mm. long, 0.39 mm. wide; oöspores 0.32 mm. long, 0.33 mm. wide, with 8 or 9 striae; whorl of crown-cells 0.07–0.09 mm. high, about 0.12 mm. wide at the base, the individual cells lanceolate-oblong, spreading.

Type collected at Bar Lake, Michigan, by Thomas Morong, *no. 10*, 1882; in the herbarium of the New York Botanical Garden.

Distribution: Only known from the original collection.

17. Chara Schneckii sp. nov.

Monoecious: 8–13 cm. high, somewhat yellowish-green, slightly incrusted; stems 0.45–0.5 mm. in diameter, the cortex unusually regular for the group, the cells, at least in the lower internodes, long and straight, the cortical node-cells usually developing secondary cells on both sides, but these, nearly always growing more strongly either upwards or downwards, thus leaving most often one, more rarely two, secondary cells between consecutive primary cells, the cortex theoretically triple thus appearing about double, interstices sometimes occurring; spine-cells rare on lower internodes, more frequent above, 0.22–0.48 mm. long, 0.05–0.07 mm. wide, somewhat obtuse at the apex: stipulodes forming a single whorl at each node, twice as many as the leaves, 0.8–1.1 mm. long, 0.09–0.12 mm. wide, acutish at the apex: leaf-whorls distant below, approximate or overlapping at the apex, containing 12–14 leaves, these 5–10 mm. long, composed of 4–6 internodes, entirely uncorticated, or occasionally the second lowest internode double corticated; leaflets 1–1.2 mm. long, 0.1–0.14 mm. wide, at the uppermost node about half this, shorter than the terminal cell of the leaf, as bracteoles 1½–2 times as long as the sporocarps: antheridia 0.21–0.23 mm. in diameter; sporocarps 0.65–0.7 mm. long, 0.42–0.46 mm. wide; oöspores 0.46–0.49 mm. long, 0.28–0.33 mm. wide, with 11 or 12 striae; whorl of crown-cells 0.07–0.09 mm. high, 0.14–0.15 mm. wide at base, the individual cells triangular-ovate, suberect.

Type collected at Mount Carmel, Illinois, by J. Schneck, Aug. 17, 1895; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

18. Chara coronatiformis sp. nov.

Monoecious: very similar in habit to *C. Schweinitzii*, but closely allied to *C. keukensis*, with which it agrees in the cortex, the number of stipulodes, and the entirely uncorticated leaves: 5–7 cm. high, stems 0.35–0.55 mm. in diameter, almost destitute of incrustation; spine-cells variable in length, most frequently 0.9–1.4 mm. long, 0.07 mm. wide: stipulodes larger than in *C. keukensis*, 1.75–2.1 mm. long, 0.17–0.2 mm. wide: leaves 1 cm. long, their lower internodes about 0.35 mm., the upper 0.2 mm. in diameter; leaflets at median nodes 1.7–1.9 mm. long, reduced at the uppermost node, mostly 0.16–0.19 mm. wide, not exceeding the diameter of the terminal cell of the leaf: antheridia 0.28–0.32 mm. in diameter; sporocarps, doubtfully normal, but if so probably mature, 0.57–0.6 mm. long, 0.44–0.46 mm. wide; oöspores orange, spherical, 0.35–0.37 mm. long, 0.35–0.38 mm. wide, the striae 8, almost imperceptible.

Type: "Van Buren Co., August, 1838, ex herb. I. C. Martindale"; in the herbarium of the New York Botanical Garden. Believed to be from southern Michigan.

Distribution: Only known from original collection.

19. **Chara Curtissii** Allen, sp. nov. [Bull. Torrey Club 7: 107, nomen. 1880]

Monoecious: 10–15 cm. high, lightly incrusted; stems 0.5–0.6 mm. in diameter, somewhat irregularly corticated, the cortical node-cells more usually giving off secondary cells on both sides, but sometimes on one side only, these secondary cortex-cells being nearly always of less diameter than the primary, and of very unequal length, sometimes becoming very narrow, the cortex, essentially triple, thus appearing double or even single; spine-cells scattered, linear-lanceolate or lanceolate, 0.2–0.44 mm. long, 0.06–0.09 mm. wide: stipulodes forming a single whorl at each node, twice the number of the leaves, foliose, 2–2.8 mm. long, 0.26–0.32 mm. wide, narrowly elliptic-lanceolate, acute at the apex: leaves 8–10 in a whorl, 1–1.2 mm. long, 0.39–0.46 mm. wide, usually containing four internodes, besides the terminal cell, entirely uncorticated; leaflets at each node subequal or very unequal, as bracteoles attaining a maximum length of over 2 mm., usually 0.25–0.3 mm. wide, narrowly elliptic, greatly exceeding the sporocarps: antheridia 0.28–0.35 mm. in diameter; sporocarps variable, probably due to incomplete maturity, the oldest 0.57–0.6 mm. long, 0.5 mm. wide, oöspores 0.4–0.42 mm. long, 0.37–0.39 mm. wide, with about 6 striae; whorl of crown-cells 0.08–0.12 mm. high, 0.2 mm. wide at base, the individual cells ovate, very shortly and obtusely beaked.

Type collected in a shallow saw-grass pond, 2 or 3 miles east of the Halifax River, Volusia County, Florida, by A. H. Curtiss, May 25, 1879; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

Illustration: Allen, Char. Am. 55. *f.* 50, as *C. flaccida.*

20. **Chara longifolia** sp. nov.

Monoecious or appearing dioecious: 15–30 cm. high, bright-green, very slightly incrusted; stems 0.8–1.2 mm. in diameter, cortication irregular, the primary rows often not straight, the node-cells forming secondary cells on either side, these usually developing in one direction only, the cortication thus numerically about double, or often two primary cells having two secondaries between them, sometimes none, irregular interstices occasionally found; spine-cells found only on the youngest internodes, ovate, 0.17–0.47 mm. long, 0.14–0.18 mm. wide, on the lower internodes represented only by small papillae, or more often entirely wanting: stipulodes forming

a single whorl at the upper nodes, probably exceeding the leaves in number, apparently early deciduous, ovate or oblong-ovate, when full-sized 3.5–8 mm. long, 0.8–0.9 mm. wide: leaves 9 or 10 in a whorl, about 6–10 cm. long, containing 3–5 internodes; leaflets somewhat unequal, 2–5 mm. long, 0.5–0.6 mm. wide: antheridia 0.36 mm. in diameter; immature sporocarps about 0.7 mm. long, 0.45 mm. wide; oöspores 0.45 mm. long, 0.38 mm. wide; whorl of crown-cells 0.17 mm. high, 0.22 mm. wide at the base, the individual cells ovate, shortly and obtusely beaked.

Type collected in Stafford County, Kansas, by M. A. Carleton, *no. 302*, July 11, 1891; in the herbarium of the New York Botanical Garden.

Distribution: Indiana to Iowa and Kansas.

A very distinct species, probably allied to *C. Hornemannii*, but at once distinguished by the absence of spine-cells from the mature internodes. In habit it greatly resembles *C. obtusa* Desv. = *Nitellopsis stelligera* (Bauer) Hy, or *Tolypellopsis stelligera* (Bauer) Mig., but lacks the starch-stars and is otherwise very different.

21. Chara keukensis (Allen)

C. gymnopitys keukensis [*Keukenis*] Allen, Bull. Torrey Club **20**: 120. 1893.

Monoecious: 3.5–8 cm. high, well incrusted; stems 0.38–0.53 mm. in diameter, essentially triply corticated, the cortical node-cells forming secondary cortical cells on both sides, which usually however develop in only one longitudinal direction, or if in both, for a short distance only, narrow interstices sometimes occurring, the number of cortex rows in a cross-section thus being about twice the number of the leaves; spine-cells few, inconspicuous, when mature 0.45–0.9 mm. long, 0.05–0.1 mm. wide: stipulodes forming a single whorl at each node, twice the number of the leaves, 0.9–1.42 mm. long, 0.1–0.14 mm. wide, acute at the apex: leaves mostly 8 in a whorl, 5–8 mm. long, entirely uncorticated, containing 2–4 internodes; leaflets 5–8, those at sterile nodes 0.7–0.9 mm. long, 0.1–0.14 mm. wide, this often exceeding the diameter of the uppermost internodes of the leaves, as bracteoles much longer, sometimes exceeding 2 mm., surpassing the mature sporocarps: antheridia 0.25–0.28 mm. in diameter; mature sporocarps 0.6–0.65 mm. long, 0.33–0.4 mm. wide; oöspores oval, black, 0.44–0.49 mm. long, 0.28–0.33 mm. wide, with 9 somewhat faint striae; whorl of crown-cells 0.09–0.11 mm. high, 0.14–0.16 mm. wide at base, the individual cells ovate or nearly hemispheric, usually well separated at their tips.

Type locality: Lake Keuka, New York.

Distribution: Central New York and Welland County, Ontario, to western Lake Erie and southeastern Illinois.

Exsiccatae: Allen, Char. Am. Exsicc. *46*.

22. Chara mexicana (Allen)

C. hydropitys mexicana Allen, Bull. Torrey Club **20**: 120. 1893.

Monoecious: 7–12 cm. high, dark-green, slightly incrusted; stems 0.3–0.46 mm. in diameter, essentially triply corticated, secondary cortex-cells usually developing more or less on both sides of the primary, though usually very unequally in the two longitudinal directions, often quite irregular, when most regular appearing as if doubly corticated except opposite the cortical node-cells; spine-cells scattered, extremely variable, linear-lanceolate to ovate or triangular, 0.05–0.32 mm. long, 0.04–0.07 mm. wide, acute at the apex: stipulodes forming a single whorl at each node, twice the number of the leaves, 0.2–0.25 mm. long, 0.06 mm. wide, linear-lanceolate, acute or acuminate: leaves 9 or 10 in a whorl, 9–10 mm. long, composed of 5 or 6 internodes, of which the lowest one and the terminal one or two are uncorticated, and the 3 (rarely 4) intervening doubly corticated, the lowest internode 1.1–1.5 mm. long, 0.22–0.26 mm. wide, the succeeding corticated internode of nearly the same dimensions; leaflets at any node nearly equal, 0.66–0.86 mm. long, 0.09–0.12 mm. wide, linear-lanceolate, acute, as bracteoles about one and a half times as long as the mature sporocarps: antheridia 0.23–0.25 mm. in diameter; sporocarps 0.57–0.6 mm. long, 0.36–0.38 mm. wide; oöspores 0.4–0.42 mm. long, 0.24–0.27 mm. wide, with 10 striae; whorl of crown-cells short, 0.07–0.09 mm. high, 0.1–0.12 mm. wide at base, the individual cells ovate, ascending.

Type collected in a still pool of a mountain brook, north Mexico, by C. G. Pringle, November, 1886.

Distribution: Only known from original collection.

Exsiccatae: Allen, Char. Am. Exsicc. *45*.

23. Chara Liebmanni sp. nov.

C. hydropitys perfecta A. Br. Fragm. Monogr. Char. 133. 1882.

Monoecious: similar in habit to the South American *C. hydropithys* Rchb., 12.5–18 cm. high; stems 0.4–0.42 mm. in diameter, the lowest nodes swollen, spherical, destitute of leaves, the cortex-cells little twisted, difficult to count, apparently very similar to those of the others of the group; spine-cells acute, about 0.05 mm. wide, the length of the longest lower ones greater than the diameter of the stem: stipulodes forming a single whorl, twice the number of the leaves, spreading, thicker than the spine-cells, similar to the leaflets: leaves mostly 10 in a whorl, usually containing 6 internodes, of which the lowest is uncorticated, 0.3 mm. thick and about

twice as long as the succeeding internodes, which are about the same length as one another, a little narrower than the uncorticated one, doubly corticated except the terminal one or sometimes two; leaflets 6–8 at all nodes, at the fertile 7 or 8, at the uppermost still 6, which are almost as long as the apical cell of the leaf, the lower ones somewhat shorter and narrower than the leaf-internodes, about twice as long as the sporocarps, not ventricose, wider than the spine-cells: antheridia 0.2–0.22 mm. in diameter; sporocarps somewhat oblong, about 0.6 mm. long, 0.36–0.38 mm. wide; oöspores black, 0.38–0.4 mm. long, 0.28–0.3 mm. wide.

Type locality: Potrero de Ponsoquitla, near Mirador, Mexico.

Distribution: Mexico to Lagoa Santa, Brazil, *fide* Braun.

24. Chara Robbinsii Halsted, Proc. Boston Soc. Nat. Hist. **20**: 183. 1879

C. hydropitys septentrionalis Nordst.; Allen, Char. Am. Exsicc. *10*. 1880.

C. hydropitys majuscula Nordst. in A. Br. Fragm. Monogr. Char. 134, in part. 1882.

? *C. nudipes* Wallm. Kongl. Vet.-Akad. Handlingar **1852**: 293. 1854. If so, the oldest name.

Monoecious: 9–18 cm. high, somewhat yellowish-green, slightly or moderately incrusted; stems 0.3–0.9 mm. in diameter, essentially triply corticated, secondary cortical cells developing on both sides of the primary, but usually extending in one direction for a very short distance and for nearly the whole length of the cortical internode in the other, the cortex thus being numerically double and so appearing if viewed casually; cortical cells usually long, spine-cells therefore distant, usually 0.6–1 mm. long, 0.09–0.1 mm. wide: stipulodes forming a single whorl at each node, twice as many as the leaves, 0.88–1.15 mm. long: leaves 11–13 in a whorl, 0.8–1.1 mm. long, the whorls distinct or somewhat overlapping at the apex, each leaf containing 6 or 7 internodes, the lowest internode of variable dimensions, 1–3 mm. long, 0.16–0.55 mm. wide, uncorticated, always wider, usually much so, than the succeeding ones, of which the next 2–5 are doubly corticated, leaving 1–3 uncorticated apical ones; leaflets of any whorl subequal, usually 1.2–1.5 mm. long, 0.11–0.16 mm. wide, about twice the length of the mature sporocarps, the terminal leaflets about two-thirds this length: antheridia 0.23–0.3 mm. in diameter; sporocarps 0.73–0.8 mm. long, 0.4–0.5 mm. wide; oöspores 0.48–0.53 mm. long, 0.3–0.38 mm. wide, with 10–12 striae; whorl of crown-cells 0.1–0.16 mm. high, 0.1–0.18 mm. wide at base, the individual cells ovate, somewhat erect or very widely spreading.

Type locality: Apponaug Pond, Rhode Island.

Distribution : Rhode Island to New Jersey and Illinois.

Exsiccatae : Allen, Char. Am. Exsicc. *10*.

The species as here conceived is somewhat polymorphic, the New Jersey plants being considerably more robust than those from Rhode Island and Connecticut. Agreement on the more essential characters seems however sufficiently close to warrant their union. Nordstedt identifies with this a plant from Vera Cruz, Mexico, which appears from the description to be somewhat different. Turckheim *606*, Alta Vera Paz, Guatemala, is also somewhat closely allied, but too imperfect for accurate determination and description.

Chara Martiana Wallm. Kongl. Vet.-Akad. Handlingar **1852** : 294. 1854, would certainly be, from the description, a species of this group. Wallman published it supposing it to be *C. Martiana* A. Br., a dioecious species of the *gymnopus* group from South America, which, however, had not then been published, though casually mentioned. The name therefore belongs to Wallman's plant and Braun's must be renamed. Wallman's description is as follows :

" Ch. Martiana : Caule subtilissime striato, striis rectis, in sicco collapso, plano, inferne subnudo, superne aculeolato, aculeis sparsis, minutissimis, diametro caulis multo brevioribus ; involucro densissimo, spinulis uniserialibus, patentibus, acicularibus, caulis diametro longioribus ; verticillis discretis, patenti-divaricatis, 10–12-radiatis ; ramentis caule duplo augustioribus, 7–8-articulatis, geniculis constrictis, nodosis, obscurioribus, usque ad apicem bracteiferis ; internodio basali proximis 2–3-plo breviori, monosiphonico, nudo, ceteris inordinate alternatim simpliciter et composite tubulosis ; ramulis intercalaribus brevissimis ; bracteis angustissimis, cuspidatis, interioribus 4 : 2 longioribus, aequalibus, nuculam subaequantibus, 2 minoribus itidem aequalibus, nucula multo brevioribus, aversis abbreviatis, saepe obsoletis. Monoica.

" Ch. Martiusii *Al. Braun*, ined. — Ch. Martiana, idem Schweizer. Char.

" Amerika, Guatemala ! Ifrån *Kegel* sänd till Apothekaren *Thedenius*, hvilken benäget meddelat densamma."

Nordstedt, however, has seen the original specimen, and says that the description is partially wrong ; that the stipulodes form a double whorl, and that the plant really is *C. sejuncta*. It is not here cited as a synonym of that species, because two specimens from re-

lated regions, one from Mexico, the other from Colombia, while both too fragmentary for description, are yet clearly *sejunctae* in a wide sense, but if here described would be treated as distinct.

25. Chara Hornemannii Wallm. Kongl. Vet.-Akad. Handlingar **1852**: 288. 1854

C. ceratophylla Halsted, Proc. Boston Soc. Nat. Hist. **20**: 182. 1879. Not *C. ceratophylla* Wallr.

Dioecious: 12–40 cm. high, somewhat yellowish- or dark-green, lightly incrusted; stems 0.7–1.5 mm. in diameter, essentially triply corticated, the cortical node-cells often developing secondary cells on both sides, but these usually elongating in one longitudinal direction only, the cortication thus appearing double, the primary cortex-cells somewhat larger and more prominent than the secondary; spine-cells very conspicuous, somewhat scattered on the lower parts of the stem, crowded near the apex, attaining a length of 8 mm., 0.3–0.55 mm. wide, obtuse, acute or acuminate at the apex: stipulodes forming a single whorl at each node, twice as many as the leaves or fewer, similar to the spine-cells, 2.5–10 mm. long, 0.35–0.7 mm. wide: leaves 8–10 in a whorl, 1–2.5 cm. long, usually containing 4 internodes, entirely uncorticated; leaflets 2–4 mm. long, 0.25–0.5 mm. wide, as bracteoles similar, much exceeding the sporocarps: antheridia 1–1.2 mm. in diameter; mature sporocarps 1–1.3 mm. long, 0.65–0.8 mm. wide; oöspores 0.56–0.8 mm. long, 0.4–0.48 mm. wide, with 5–7 striae; whorl of crown-cells about 0.175 mm. high, 0.2 mm. wide at base, ovate, the cells connivent.

Type locality: Crab Island, West Indies.

Distribution: Tropical and subtropical America from southern Florida and New Mexico through the West Indies and Mexico to southern Brazil.

Illustrations: Kütz. Tab. Phyc. **7**: *pl. 48. f. 1;* A. Br. Fragm. Monogr. Char. *pl. 2. f. 74; pl. 3. f. 75* (?).

26. **Chara Nordhoffiae** (Allen)

C. Hornemanni Nordhoffiae Allen, Bull. Torrey Club **27**: 299. *pl. 12, 13.* 1900.

Dioecious: closely allied to *C. Hornemannii* Wallm., but of somewhat different habit, owing to the longer internodes and more spreading leaves: 0.25–0.5 m. high, not incrusted; stems 1–1.5 mm. in diameter, cortex much as in *C. Hornemannii*, but the primary cortical cells distinctly more prominent than the secondary; spine-cells few on the lower internodes of the stem, more frequent but not crowded above, usually about 5 mm. long, but reaching a maximum length of 9 mm., 0.36–0.44 mm. wide: stipulodes forming

a single whorl at each node, mostly 6–9 mm. but becoming 12 mm. long, 0.44–0.53 mm. wide, about twice the number of the leaves, the latter reaching 8 cm. in length: antheridia 0.72–0.84 mm. in diameter; sporocarps 0.95–1.1 mm. long, 0.5–0.58 mm. wide; oöspores 0.6–0.72 mm. long, 0.32–0.44 mm. wide, with 5–7 prominent striae.

Type locality: Lakeside, San Diego County, California.

Distribution: Only known from type collection, and a species of very doubtful validity. Many of the measurements relied upon by Dr. Allen to separate it from *C. Hornemannii* were erroneous, and if further collections should show that the narrowness of the fruit is due to immaturity, it must be reduced to the status of a rather luxuriant form. The fruit of both species is insufficiently known and for that of *C. Hornemannii* Dr. Allen may have relied upon Braun's figure, which does not resemble any fruit on plants of this species in the herbarium of the New York Botanical Garden. Braun describes the oöspore of *C. Hornemannii* as 10-striate.

Illustrations: Bull. Torrey Club *loc. cit.*

Exsiccatae: Allen, Char. Am. Exsicc. *sine num.*

27. Chara leptosperma A. Br. Fragm. Monogr. Char. 184. *pl. 4. f. 93–96.* 1882

Monoecious: resembling in habit *C. fragilis brevifolia* A. Br., golden-green to occasionally dark-green, or greenish-brown, slightly incrusted, not very fragile; stems very slightly twisted, 0.45–0.5 mm. in diameter, or the lowest internodes attaining a maximum of 0.6–0.62 mm., triply corticated, 12–14 cells in a transverse section of the stem, primary and secondary cells equally wide and prominent, the secondary cells with horizontal terminal walls; spine-cells small but distinct, hemispheric: stipulodes forming a double whorl at each node, those in the lower whorl as long as the upper, 0.35–0.36 mm. long, about 0.06 mm. wide, less pointed than the leaflets: leaf-whorls distant, the leaves nearly upright, but slightly incurved, 7–9 in a whorl, about 1 cm. long, containing 6–7 doubly corticated internodes, of about equal length, 3 or 4 of them fertile, and an uncorticated conical terminal cell; leaflets present at all nodes, but at sterile nodes very short and inconspicuous, almost upright, papilla-like, moderately pointed, the two anterior the longer, as bracteoles the two anterior about the same length as the sporocarps, somewhat longer than the two lateral, moderately pointed, 0.08–0.11 mm. in width: antheridia about 0.25 mm. in diameter; sporocarps slender, 0.83–0.85 mm. long, 0.36–0.37 mm. wide; oöspores golden-brown and transparent, 0.55–0.6 mm. long, 0.3 mm. wide, with 11 or 12 striae; whorl of crown-cells 0.18–0.19 mm. high, and of equal width, the individual cells closely connivent.

Type locality: Between Morro and Rancho nuevo, Dept. Vera Cruz, Mexico.

Distribution: Mexico.

Illustrations: A. Br. *loc. cit.*

This form, of very doubtful specific value, is distinguished from *C. fragilis* by the golden, not black, oöspores, the more slender sporocarps, and by having well-developed stipulodes in spite of the short bracteoles.

28. CHARA FRAGILIS Desv.; Loisel. Not. Fl. France 137. 1810

C. vulgaris L. Sp. Pl. 1156, in part. 1753.

Monoecious: polymorphic, 2.5–75 cm. high, slightly or moderately incrusted, occasionally bearing bulblets; stems 0.35–0.85 mm. in diameter, very regularly triply corticated, the primary and secondary cortical cells nearly equally wide and prominent, usually comparatively narrow, cortical node-cells very small and inconspicuous, never bearing spine-cells and very rarely papillae: stipulodes greatly reduced and inconspicuous, forming a double whorl at each node, or more or less undeveloped: leaves 6–9 in a whorl, 4–30 mm. long, containing 5–8 doubly corticated internodes, and an uncorticated 1- or 2-celled tip; the posterior and sometimes all the leaflets at the sterile nodes wanting, the anterior however often present though short, rarely 0.4 mm. long, as bracteoles only one or two on each side of the oögonium developed, when two the anterior the longer, much shorter than or exceeding the mature sporocarp: antheridia 0.3–0.4 mm. in diameter; sporocarps 0.78–1.1 mm. long, 0.45–0.63 mm. wide; oöspores black, 0.58–0.72 mm. long, 0.36–0.48 mm. wide, with 10–14 striae; whorl of crown-cells 0.14–0.2 mm. high, 0.17–0.25 mm. wide at base, the individual cells oblong, usually truncate at the apex, usually erect and connivent.

Type locality: Paris, France.

Distribution: Canada, United States and Mexico, but apparently not in the West Indies; cosmopolitan.

Illustrations: Kütz. Tab. Phyc. **7**: *pl. 54, 55;* Flora Danica **16**: *pl. 2796, 2797;* Jour. Bot. **18**: *pl. 207, f. 1;* Migula, Char. Deutsch. Oesterr. Schw. *f. 146, 147;* Migula, Consp. Char. Eur. *f. 131, 132;* J. E. Smith, Eng. Bot. Supp. **2**: *pl. 2762;* Ganterer, Oesterr. Char. *pl. 2. f. 15, 16;* Oltmanns, Morph. Biol. Alg. *pl. 207;* Woods, Flor. Neb. **1**: *pl. 35;* E. & P. Natürl. Pflanzenfam. 1^2: *pl. 109.*

Exsiccatae: Allen, Char. Am. Exsicc. *21;* Collins, Holden & Setchell, Phyc. Bor. Am. *1198.*

Migula, Groves and others, cite among the synonyms of this

species *C. globularis* Thuill. Flore Env. Paris. ed. 2. 472. 1799, and *C. capillacea* Thuill. *loc. cit.* 1799. From the descriptions it seems very probable that both are forms with abnormal sporocarps. If one or both are identical with *C. fragilis* the latter name must be replaced, but without absolute certainty it is here considered inadvisable to make any change in what is perhaps the longest-established and most widely accepted specific name in the genus.

29. CHARA VERRUCOSA Itzigsohn, Bot. Zeit. **8**: 338. 1850

C. delicatula Ag. Syst. Alg. 130. 1824. Not *C. delicatula* Desv. 1810.

C. fragilis delicatula von Leonh. Oesterr. Arml.-Gew. 90. 1864.

Monoecious: 5–30 cm. high, rather slightly incrusted; stems 0.33–0.53 mm. in diameter, regularly triply corticated, the primary cortical cells clearly of greater diameter than the secondary cells, and projecting somewhat beyond them, the secondary cells occasionally somewhat irregular, sometimes leaving only a single secondary cell between two primaries; cortical node-cells sufficiently conspicuous, usually forming papillae, rarely becoming short spine-cells: at least the stipulodes of the upper whorl well developed, 0.12–0.42 mm. long, those in the lower nearly always shorter, usually 0.09–0.18 mm. long, sometimes very inconspicuous: leaves 7 or 8 in a whorl, 4–21 mm. long, containing 3–9, much most frequently 8 or 9, doubly corticated internodes, and a 1–3-celled uncorticated apex; posterior leaflets undeveloped, or reduced to mere papillae, the anterior at sterile nodes 0.1–0.44 mm. long or hardly developed, as bracteoles variable, 0.28–1.4 mm. long, more often exceeding the mature sporocarps: antheridia 0.35–0.56 mm. in diameter; sporocarps 0.9–1.12 mm. long, 0.52–0.7 mm. wide; oöspores 0.63–0.8 mm. long, 0.47–0.6 mm. wide, with 11–13 striae; whorl of crown-cells 0.1–0.24 mm. high, 0.18–0.26 mm. wide, the individual cells oblong-lanceolate to ovate, mostly connivent.

Type locality: Germany.

Distribution: Maine and New York to Alaska and California; Europe.

Illustrations: Jour. Bot. **18**: *pl. 207. f. 1a;* A. Br. Fragm. Monogr. Char. *pl. 7. f. 269, 270;* Migula, Char. Deutsch. Oesterr. Schw. *f. 148;* Migula, Consp. Char. Eur. *f. 133;* Fl. Dan. **16**: *pl. 2798.*

Exsiccatae: Allen, Char. Am. Exsicc. *22;* Collins, Holden & Setchell, Phyc. Bor. Am. *1199.* The latter plant, from California, diverges considerably from typical material, the former contains some *C. aspera.*

30. Chara aspera Willd. Ges. Naturf. Fr. Berlin Mag. 3: 298. 1809

C. aspera nitidula A. Br. Fragm. Monogr. Char. 175. 1882.

Dioecious: 10–18 cm. high, dull- or pale-green, very slightly incrusted, bulblets often present; stems 0.33–0.45 mm. in diameter, triply corticated, but the secondary cells often developed in one longitudinal direction only, or for short distances only in either or both directions, the stems thus numerically about doubly corticated; spine-cells variable, linear to ovate, 0.12–0.9 mm. long: stipulodes forming a double whorl at each node, medium in length, those in the upper whorl somewhat the longer, 0.27–0.66 mm. long, 0.05–0.1 mm. wide: leaves 7–10 in a whorl, 6–15 mm. long, containing 5–7 doubly corticated internodes, with an extremely variable 1- or 2-celled uncorticated tip, this last acute to square-cornered at the apex; all leaflets at any node developed, but the anterior the longer, at sterile nodes usually 0.35–0.52 mm. long, but at young nodes sometimes less, the posterior usually one-half to one-third this length; lateral bracteoles almost always exceeding the antheridia and probably the oögonia, usually 0.63–0.96 mm. long, rarely less: antheridia 0.4–0.57 mm. in diameter; only immature sporocarps seen on American material, but according to Migula and Allen, when mature 0.75–0.9 mm. long, 0.4–0.55 mm. wide; oöspores 0.44–0.65 mm. long, 0.28–0.4 mm. wide, with 11–16 striae; whorl of crown-cells according to Migula 0.08 mm. high, 0.14 mm. wide at base, but in the immature American sporocarps 0.14 mm. high, 0.16–0.18 mm. wide at base, the individual cells lanceolate, ascending.

Type locality: Warnemünde, Mecklenburg-Schwerin, Germany.

Distribution: Newfoundland to Long Island, also New Mexico; also Europe and N. W. Africa. The New Mexican plants are rather different from northern ones, but themselves vary, and are better not separated at present.

Illustrations: Bull. Torrey Club 9: *pl. 21, f. A, 1–3, 7;* Kütz. Phyc. Tab. 7: *pl. 52. f. 1;* Jour. Bot. 18: *pl. 207, f. 4;* Migula, Char. Deutsch. Oesterr. Schw. *pl. 134, 135;* Migula, Consp. Char. Eur. *f. 119, 120;* Grev. Crypt. Fl. 6: *pl. 339.*

Exsiccatae: Collins, Holden, & Setchell, Phyc. Bor. Am. *1196.*

31. **Chara Macounii** Allen, in herb.

C. aspera Macounii Allen, Bull. Torrey Club 9: 44. *pl. 21. f. B, 4–6.* 1882.

Dioecious, or in extremely rare cases antheridia and oögonia on different nodes of the same leaf: 5–10 cm. high, dull-green, slightly incrusted, bulblets often present; stems 0.25–0.44 mm. in diameter, corticated as in *C. aspera*, but the spine-cells reduced to papillae,

0.04–0.11 mm. or very rarely 0.18 mm. long: stipulodes also reduced, ovate or oblong, those in the upper whorl usually 0.09–0.16 mm. long, rarely either more or less than this, those in the lower whorl 0.05–0.14 mm. long: leaves 6–8 in a whorl, 0.7–1.4 mm. long, the lower 3–8, usually 6 or 7, internodes doubly corticated, the uncorticated tip 1–3-celled; posterior leaflets reduced to mere papillae, 0.035–0.085 mm. long, the anterior 0.09–0.26 mm. long, in both cases rarely near the upper limit given, as bracteoles in male plants the anterior 0.18–0.32 mm. long, or about one-half the diameter of the antheridia except when the latter are very young, on female plants the anterior bracteoles 0.42–0.7 mm. long, slightly exceeding or shorter than the probably immature sporocarps: antheridia seen up to 0.62 mm. in diameter; most nearly mature sporocarp 0.7 mm. long, 0.45 mm. wide, its oöspore 0.42 mm. long, 0.35 mm. wide, striae probably 8–10; whorl of crown-cells 0.1–0.12 mm. high, 0.2 mm. wide at base, the individual cells ovate-globose, not closely connivent.

Type collected by John Macoun, *no. 16*, at Long Lake, Saskatchewan, July 8, 1879; in the herbarium of the New York Botanical Garden.

Distribution: Vermont to Saskatchewan.

Illustrations: Bull. Torrey Club *loc. cit.*

Exsiccatae: Allen, Char. Am. Exsicc. *27*.

Originally considered a distinct species by Dr. Allen, but he was persuaded to reduce it to a variety of *C. aspera*, which is its nearest ally. It seems to be distinct, however, by having shorter stipulodes, by the reduction of the spines to papillae, by the similar reduction of the posterior leaflets, and by shorter bracteoles. Probably also the striae upon the oöspore are fewer than in any form of genuine *C. aspera*.

32. Chara cubensis Allen, Bull. Torrey Club **21**: 163. *pl. 189*. 1894

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, the lowest rarely on that between the uncorticated basal and the lowest of the corticated internodes, usually on the node between the two lowest corticated internodes: rather pale-green, 0.4–0.5 m. high, slightly incrusted; stems 0.6–0.84 mm. in diameter, triply corticated; spine-cells 0.2–0.9 mm. long, but inconspicuous, linear, acute: stipulodes forming a double whorl at each node, those in the upper whorl 0.84–0.96 mm. long, very nearly equaling the length of the uncorticated basal leaf-internode, stipulodes of lower whorl 0.52–0.6 mm. long: leaves 12–15 in a whorl, 2–3 cm. long, containing 6–9 internodes, the basal one uncorticated, the next two or sometimes three triply corticated, the remainder uncorticated, or

more rarely the leaves entirely uncorticated, the uncorticated basal-leaf internode 0.9–1.15 mm. long, 0.34–0.55 mm. wide, the succeeding corticated internodes approximately 2.5 mm. long, and the uncorticated ones, except the last, 5–6.5 mm. long; leaflets at sterile nodes usually slightly unequal, 0.4–1.1 mm. long, as bracteoles the anterior and lateral usually the longer, 1–1.4 mm. long, the posterior 0.88–1 mm. long, all exceeding the sporocarps: antheridia 0.3–0.36 mm. in diameter; only immature sporocarps on type material, the best developed of these 0.6–0.68 mm. long, 0.38–0.44 mm. wide, with oöspores 0.42–0.46 mm. long, 0.35–0.4 mm. wide, said by Allen to be 0.6 mm. long; striae inconspicuous, 12-14; whorl of crown-cells 0.12–0.16 mm. high, 0.17–0.21 mm. wide at base, the individual cells lanceolate, rounded at the apex, widely spreading.

Type locality; Guaiman (?), Cuba.

Distribution: Cuba.

Illustration: Bull. Torrey Club *loc. cit.*

Placed by Allen with either *C. foliolosa* or *C. zeylanica*, but it is evidently near and possibly too near *C. inconstans*.

33. Chara elegans (A. Br.)

C. gymnopus elegans A. Br.; Allen (Bull. Torrey Club **2**: 10. 1871; hyponym), Char. Am. *pl. 1.* 1879.

Monoecious, the antheridia and oögonia at the same leaf-nodes, the lowest occurring on the node between the uncorticated basal and the lowest of the corticated internodes of the leaf: 15–25 cm. high, light-green, only moderately incrusted; stems 0.6–0.9 mm. in diameter, triply corticated, the primary cortical cells often broader than the secondary, comparatively short, 0.55–0.6 mm. long when full length, adjacent ones nearly of equal length, so that the spine-cells borne at the cortical node-cells appear to form whorls around the stem, about ten such whorls in each internode; spine-cells 1–1.6 mm. long, 0.1–0.12 mm. wide at the base: stipulodes forming a double whorl at each node, those in the upper whorl reaching a length of over 1.8 mm., exceeding in length the uncorticated basal internode of the leaves, stipulodes of lower whorl 0.9 mm. long: leaves 9–12 in a whorl, 1.4–1.8 cm. long, containing 7–9 internodes, all triply corticated, except the basal internode, and one or more at the apex, which are uncorticated; basal uncorticated internode about 0.7 mm. long; leaflets at sterile nodes nearly equal, 0.5–1.3 mm. long, as bracteoles the anterior 0.8–2.3 mm. long, the posterior usually a little less, 0.77–1.5 mm. long, always exceeding and usually much exceeding the mature sporocarps: antheridia about 0.5 mm. in diameter; sporocarps of variable size, dimensions given by Allen 0.6–0.75 mm. long, 0.4–0.5 mm. wide, but apparently nearly always larger, 0.84–1.27 mm. long, 0.43–0.75 mm. wide;

oöspores 0.56–0.8 mm. long, 0.38–0.5 mm. wide, with 12–15 striae; whorl of crown-cells 0.21–0.23 mm. high, 0.21–0.25 mm. wide at base, the individual cells lanceolate, their apices obtuse, usually widely separated.

Type locality: Peekskill, New York.

Distribution: Essex County, Massachusetts, to Lakes Champlain and Saratoga and the Hudson River.

Illustrations: Allen, Char. Am. *pl. 1.* 1879; *pl. 1.* 1880; Bull. Torrey Club **27**: *pl. 15. f. 5.*

Exsiccatae: Allen, Char. Am. Exsicc. *23.*

A plant from New Haven, Connecticut, agrees with this in practically every character, except that the dimensions are smaller with hardly an exception. Considerable variations in size are therefore to be expected.

34. Chara inconstans A. Br.; Kütz. Tab. Phyc. **7**: 28. *pl. 70. f. 2.* 1857

C. (*inconstans*) *Oerstediana* A. Br. Monatsber. Königl. Akad. Wissensch. Berlin **1858**: 367. 1858.

C. Crügeriana A. Br. Monatsber. Königl. Akad. Wissensch. Berlin **1858**: 368. 1858.

C. Oerstediana A. Br.; Allen, Char. Am. 3. 1880.

C. gymnopus inconstans f. Örstediana A. Br. Fragm. Monogr. Char. 193. 1882.

C. gymnopus inconstans f. Crügeriana A. Br. Fragm. Monogr. Char. 193. 1882.

C. gymnopus inconstans A. Br.; Allen, Publ. Bot. Field Columb. Mus. **1**: 286. 1896.

C. zeylanica inconstans H. & J. Groves, Jour. Linn. Soc. **33**: 323. 1898.

Monoecious, the antheridia and oögonia borne together upon the three lowest leaf-nodes: 4.5–15 cm. high, ashen or pale-green, or ferruginous-ochraceous below; stems 0.6–0.75 mm. in diameter, triply corticated; spine-cells variable, 0.07–0.8 mm. long, acutish: stipulodes forming a double whorl at each node, those in the upper whorl 0.4–0.9 mm. long, nearly always shorter than the uncorticated basal internode of the leaves, stipulodes of lower whorl 0.28–0.68 mm. long: leaves 9–12 in a whorl, 5–15 mm. long, containing 5–7 internodes besides the apical cell, of which the lowest one is uncorticated, the next 1–3 triply corticated, and the remainder uncorticated, or the leaves of the lowest whorls entirely uncorticated; uncorticated basal internode 0.56–0.9 mm. long, or 2–6 times as long as broad, nearly equaling or shorter than the lowest of the

corticated internodes, the latter usually about 1 mm. long; leaflets at sterile nodes 0.18–1.25 mm. long, according to Braun the anterior the longer, in the specimens examined almost of equal length, as bracteoles the anterior pair the longest, twice as long as or rarely only slightly exceeding the sporocarps, the others as long as or shorter than the sporocarps: antheridia 0.25–0.35 mm. in diameter; sporocarps 0.63–0.85 mm. long, 0.36–0.4 mm. wide; oöspores 0.48–0.6 mm. long, 0.28–0.3 mm. wide; striae on entire side of sporocarp 14–15; crown-cells elongated, cylindrical, or shorter, erect or diverging.

Type locality: Trinidad, West Indies.

Distribution: Trinidad and Central America.

Illustration: Kütz. Tab. Phyc. *loc. cit.*

Following Braun, the Trinidad and Nicaraguan plants are placed together. Some of the measurements are from plants collected by Wright in Lake Nicaragua, certainly *Oerstediana*, and by Gaumer in Yucatan, which are nearer to *Crügeriana*. Additional mature material must be collected before the true status is finally determined.

35. **Chara filicaulis** sp. nov.

Monoecious, the antheridia and oögonia borne together upon the leaf-internodes, including that between the uncorticated basal and the lowest of the corticated leaf-internodes: probably 0.4–0.5 m. high, bright-green or the older internodes becoming grayish, very slightly incrusted; stems 0.4–0.52 mm. in diameter, ultimately triply corticated, but the secondary cells developing irregularly, so that the youngest internodes often seem doubly corticated, or rarely two primary cells are not separated by secondary ones; or on the contrary, by the ends of two secondaries from consecutive cortical nodes slipping past one another, three secondary cells may intervene between two primaries; apical stem-internodes short, beset with spine-cells 0.88–1.25 mm. or even 1.5 mm. long, 0.04–0.09 mm. wide, older internodes becoming 5–10 cm. long, with scattered spine-cells: stipulodes forming a double whorl at each node, those in the upper whorl 0.7–0.88 mm. long, 0.07–0.09 mm. wide, 1–1⅓ times as long as the uncorticated basal leaf-internodes, stipulodes of lower whorl 0.52–0.6 mm. long: leaves 8–10 in a whorl, 1.2–1.8 cm. long, containing 8–10 internodes, all triply corticated except the basal one and the terminal cell, uncorticated basal internode 0.44–0.7 mm. long, 0.2–0.25 mm. wide; leaflets at sterile nodes 0.17–0.45 mm. long, the anterior usually distinctly longer than the posterior, as bracteoles the anterior 0.85–1.25 mm. long, slightly exceeding the sporocarps, posterior bracteoles 0.19–0.23 mm. long: antheridia rather early deciduous, 0.37-0.42 mm. in diameter; sporocarps 0.84–0.95 mm. long, 0.37–0.47 mm. wide; oöspores 0.63–0.75 mm. long, 0.32–0.42 mm. wide, with 12–14 striae; whorl of crown-cells 0.11–0.14 mm.

high, 0.15–0.17 mm. wide at base, the individual cells lanceolate, somewhat erect or more often widely spreading.

Type collected in the Everglades, Florida, by A. H. Curtiss, February, 1882; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

36. Chara fertilissima (A. Br.)

C. gymnopus fertilissima A. Br. Fragm. Monogr. Char. 192. 1882.

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, including that between the uncorticated basal and the lowest of the corticated leaf-internodes: of medium size, golden to green in color, collapsing when dry, brittle; stems triply corticated; spine-cells visible only on the upper whorls, often decidedly whorled, usually small and acute, occasionally longer. stipulodes forming a double whorl at each node, those in the upper whorl covering the uncorticated basal internode of the leaves: leaves 12 or 13 in a whorl, the uncorticated basal internode succeeded by 4–6 triply corticated, and these by 1–3 uncorticated internodes, the uncorticated basal internode about twice as long as wide; fertile leaf-nodes with about 3 posterior, short, or even very short bracteoles, and 4–6 elongated ones, the pair most anterior the longest, usually longer than, often twice as long as the sporocarps, very acute, 0.08–0.09 mm. wide: sporocarps slender, 0.87–0.92 mm. long, 0.38–0.43 mm. wide, with 14 striae; oöspores 0.6–0.65 mm. long, 0.3–0.34 mm. wide, black, the striae barely visible; crown-cells short, erect.

Type locality: Martinique.

Distribution: Only known from original collection.

37. Chara guatemalensis (Nordst.)

C. gymnopus guatemalensis Nordst. Hedwigia **27**: 193. 1888.

Monoecious, the antheridia and oögonia borne together upon the 2 or 3 lowest leaf-nodes: about 30 cm. high, golden-green, somewhat glistening, not incrusted; stem about 0.5 mm. in diameter, triply corticated; spine-cells very short, acute: stipulodes acute, about 0.1 mm. in diameter, forming a double whorl at each node, those in the upper somewhat longer than those in the lower, but not, or only at the youngest nodes, covering the uncorticated basal internode of the leaves: leaf-whorls separate, composed of about 10 leaves, 1–2 cm. long, with 6–8 internodes, entirely uncorticated, lowest internode about 3–4 times as long as wide, nearly equaling the succeeding ones, the second no longer than the third, terminal cell short, acute; leaflets 0.075–0.1 mm. in diameter, acute, at fertile nodes 7, the 3 posterior short, somewhat projecting, the 2 lateral

almost as long as the sporocarp or somewhat shorter, the anterior usually somewhat longer, leaflets at sterile nodes shorter : antheridia 0.5 mm. in diameter; sporocarps 1 mm. long; oöspores 0.62 mm. long, 0.42–0.45 mm. wide; crown-cells 0.2 mm. high, often conic-cylindric, sometimes still shorter.

Type collected at Laguna de Ysabal, Guatemala, by G. Bernoulli, *no. 879*, August, 1870.

Distribution : Guatemala, Honduras.

38. Chara carmenensis Allen, Bull. Torrey Club **21** : 164. *pl. 190.* 1894

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, including that between the uncorticated basal and the lowest of the corticated leaf-internodes : about 25 cm. high, light-green, very slightly incrusted; stem 0.5–0.7 mm. in diameter, triply corticated, spine-cells slender, 0.1–0.82 mm. long, or less often reduced to small papillae : stipulodes forming a double whorl at each node, those in the upper whorl 0.66–0.88 mm. long, considerably shorter than the uncorticated basal leaf-internodes, stipulodes of lower whorl 0.38–0.52 mm. long : leaves 8–10 in a whorl, 1.5–2 cm. long, containing 7–9 internodes, of which the lowest one, the apical cell, and the internode next below it are always or nearly always uncorticated, the remaining internodes triply corticated, uncorticated basal internode 1.05–1.7 mm. long, 0.25–0.45 mm. wide; leaflets at sterile nodes about equal, 0.12–0.42 mm. long, as bracteoles the anterior 0.8–1.15 mm. long, exceeding the sporocarps, posterior bracteoles 0.12–0.35 mm. long : antheridia 0.3–0.4 mm. in diameter; sporocarps 0.8–0.92 mm. long, 0.42–0.46 mm. wide; oöspores 0.52–0.6 mm. long, 0.33–0.39 mm. wide, with 11 or 12 very prominent striae; whorl of crown-cells 0.1–0.16 mm. high, 0.16–0.21 mm. wide at base, the individual cells lanceolate, rounded or almost truncate at the apex, erect but not connivent.

Type locality : Carmen Island, Gulf of California, Mexico.

Distribution : Only known from original collection.

Illustration : Bull. Torrey Club *loc. cit.*

39. Chara Hicksii Allen, Bull. Torrey Club **21** : *pl. 191.* 1894

C. inconstans Hicksiana Allen, *loc. cit.* 164.

Monoecious, the antheridia and archegonia borne upon the same leaf-nodes, occurring at the node between the uncorticated basal and lowest corticated internodes : about 4 cm. high, cespitose, grayish in color, proportionately heavily incrusted, resembling *C. keukensis* in habit; stems 0.5–0.66 mm. in diameter, cortication in most parts very regularly triple, but at intervals becoming irregular, secondary cortical cells failing to develop, or primary cells running

diagonally across the stem, or interstices being left, or the ends of two secondary cells well overlapping, primary cortical rows being adjacent, or separated by one, two, or three secondary cortical cells; spine-cells rather numerous, 0.1–0.4 mm. long: stipulodes forming a double whorl at each node, those in the upper whorl 0.58–0.72 mm. long, rarely equaling, usually much shorter than the uncorticated basal internode of the leaves, especially at the lower nodes of the stem, stipulodes of lower whorl 0.32–0.4 mm. long: leaves about 10 in a whorl, 4–8 mm. long, containing 5–7 internodes, which are triply corticated except the basal one and rarely the apical one, which are uncorticated, as is also the 1–3-celled leaf-tip, length of uncorticated basal internode 0.7–1.8 mm., when mature 2–5 times as long as broad; leaflets at sterile nodes nearly equal, 0.22–0.33 mm. long, as bracteoles the anterior much the longer, 0.6–0.92 mm. long, as a rule slightly exceeding the sporocarps, but often shorter than them, posterior bracteoles 0.26–0.37 mm. long, the lateral intermediate in length: antheridia 0.32–0.46 mm. in diameter; sporocarps 0.8–0.9 mm. long, 0.5–0.58 mm. wide; oöspores 0.54–0.65 mm. long, 0.33–0.37 mm. wide, with 12–14 striae; whorl of crown-cells 0.09–0.1 mm. high, 0.14–0.18 mm. wide at base, the individual cells ovate, rounded at the apex, diverging.

Type locality: Munith, Jackson County, Michigan.

Distribution: Only known from original collection.

Illustration: Bull. Torrey Club *loc. cit.*

40. **Chara stellata** sp. nov.

Monoecious, the antheridia and oögonia borne together upon the three lowest leaf-nodes: probably about 25 cm. high, dark-green, very lightly incrusted; stems 0.52–0.63 mm. in diameter, triply corticated; spine-cells somewhat rigid, spreading, 0.3–1.6 mm. long, 0.05–0.11 mm. wide, but the great majority 0.7–1.2 mm. long, 0.07 mm. wide, of almost unchanging diameter except near the subacute apex: stipulodes forming a double whorl at each node, those in each whorl normally twice the number of the leaves, or some in either aborting, though this is most unlikely to be a constant character, those in the upper whorl 0.85–1.3 mm. long, much exceeding but not concealing the uncorticated basal leaf-internodes; stipulodes of lower whorl 0.4–0.68 mm. long: leaves 7–9 in a whorl, about 1 cm. long, containing 7–10 internodes, triply corticated, except the basal one, the apical cell, and usually the internode below the apical cell, which are uncorticated; uncorticated basal leaf-internode usually 0.44–0.54 mm. long, 0.35–0.44 mm. wide; usually 4 or 5 leaflets developed at sterile but 8 or 9 at fertile nodes, those at the sterile nodes 0.6–1.1 mm. long, those at a single node of nearly the same length, at the fertile nodes the anterior pair 1–1.5 mm. long, exceeding the rest, which are nearly equal, the pos-

terior hardly reduced, 0.6–1.1 mm. long, all usually exceeding the sporocarps: antheridia very early deciduous, none seen with a greater diameter than 0.27 mm.; sporocarps 0.75–0.88 mm. long, 0.4–0.46 mm. wide, with 10 or 11 light striae; whorl of crown-cells 0.09–0.11 mm. high, 0.16–0.18 mm. wide at base, seen as a whole appearing nearly flat-topped, the individual cells globose-ovate, connivent or sometimes spreading.

Type collected by Edward Palmer, *no. 705*, at Durango, Mexico, April to November, 1896; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

A plant with much the habit of *C. Sanctae-Margaritae*, but approaching in some ways even more closely to *C. elegans*.

41. **Chara Sanctae-Margaritae** (Allen)

C. gymnopus Sanctae-Margaritae Allen, Bull. Torrey Club **27**: 303. *pl. 14; 15, f. 1–4.* 1900.

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes: 0.1–1 m. high, light-green, moderately but often unequally incrusted; stems 0.6–1 mm. in diameter, triply corticated, the terminal internodes beset with, the lower ones less so or nearly destitute of, spine-cells, the length of the latter usually 0.7–1 mm.: stipulodes forming a double whorl at each node, those in the upper linear, acute, about 0.7 mm. long, 0.125 mm. wide, usually nearly twice the length of the uncorticated basal internode of the leaves, stipulodes of the lower whorl of similar width, but only 0.35–0.45 mm. long: leaves 10–12 in a whorl, 1–1.5 mm. long, containing 8–10 internodes, all triply corticated except the basal one, and the terminal one, or sometimes two, which are uncorticated; leaflets at all nodes well developed, 0.3–0.82 mm. long, those at any node the same size or more often the anterior the longer, similar as bracteoles, the anterior 0.96–1.2 mm. long, exceeding the sporocarps, usually slightly, but sometimes one and a half times their length, posterior bracteoles 0.3–0.6 mm. long: antheridia about 0.35 mm. in diameter, often early deciduous; sporocarps 0.8–1 mm. long and 0.4–0.44 mm. wide, oöspores 0.63–0.68 mm. long, 0.28–0.34 mm. wide, with 13 or 14 striae; whorl of crown-cells 0.14–0.2 mm. high, 0.16–0.2 mm. wide at base, the individual cells lanceolate-ovate, rounded at the apex, ascending.

Type locality: Lakeside, San Diego County, California

Distribution: Central and southern California.

Illustration: Bull. Torrey Club *loc. cit.*

42. CHARA FOLIOLOSA Muhl.; Willd. Mém Acad. Roy. Berlin **1803**: (Cl. Phil. Exper.) 86. *pl. 1. f. 2.* 1805

C. foliosa Pers. Syn. Pl. **2**: 530. 1807.

? *C. compressa* Kunth; H.B.K. Nov. Gen. **1**: 45. 1815.

? *C. polyphylla Humboldtiana* A. Br. Boston Jour. Nat. Hist. **5**: 264. 1845.

C. polyphylla Muhlenbergii A. Br. Boston Jour. Nat. Hist. **5**: 264. 1845.

C. polyphylla minor Kütz. Sp. Alg. 522. 1849.

? *C. polyphylla Humboldtii* Kütz. Sp. Alg. 522. 1849.

C. Wikströmii Wallm. Kongl. Vet.-Akad. Handlingar **1852**: 297. 1854.

C. (*polyphylla*) *Humboldtii* A. Br. Monatsber. Konigl. Akad. Wissensch. Berlin **1858**: 360. 1858.

C. gymnopus Humboldtii A. Br.; Allen, Char. Am. 2. 1880.

C. depauperata Allen, Bull. Torrey Club **21**: 167. *pl. 192.* 1894.

Monoecious, the antheridia and oögonia occurring at the same leaf-nodes: 15–60 cm. high, lightly or moderately incrusted; stems 0.6–1.2 mm. in diameter, triply corticated; spine-cells often numerous on the youngest internodes, very scattered on older ones, extremely variable even on a single internode, ranging from mere papillae to slender cells nearly 2 mm. long: stipulodes forming a double whorl at each node, those in the upper whorl 0.56–1.3 mm., most frequently 0.7–0.8 mm. long, usually exceeding but not concealing the uncorticated basal internodes of the leaves; stipulodes of lower whorl 0.32–0.84 mm. long, from one-half to three-fourths the length of the corresponding stipulode of the upper whorl: leaves 10–15 in a whorl, 12–35 cm. long, containing 10–20 internodes, the latter when mature triply corticated, except always the basal one, and rarely one or more at the apex, which are uncorticated; young leaves said to be sometimes entirely uncorticated; the uncorticated basal internode 0.4–1 mm. long, and of equal or slightly less diameter; leaflets at any sterile node subequal, 0.17–0.55 mm. long, those at the node between the uncorticated basal and the lowest of the corticated internodes similar to the rest, as bracteoles the anterior 0.7–1.55 mm. long, usually shorter than but sometimes a little exceeding the sporocarps, the posterior much shorter but still well developed, 0.14–0.33 mm. long: antheridia 0.38–0.56 mm. in diameter; sporocarps 0.9–1.2 mm. long, 0.5–0.67 mm. wide; oöspores 0.68–0.78 mm. long, 0.4–0.5 mm. wide, with 11–15 striae; whorl of crown-cells 0.15–0.19 mm. high, 0.21–0.23 mm. wide at base, the individual cells lanceolate, nearly erect but not connivent.

Type locality: Pennsylvania.

Distribution: Pennsylvania to South America.

Illustrations: Mém. Acad. Roy. Berlin *loc. cit.*; Kütz. Phyc. Tab. **7**: *pl. 77, f. 1* (*C. compressa*); Bull. Torrey Club **21**: *pl. 192* (*C. depauperata*, a very abnormal condition).

Exsiccatae: Allen, Char. Am. Exsicc. *24*.

Sometimes very luxuriant forms occur which seem referable to this species, though the vegetative organs have dimensions much in excess of the maximum figures given above. Those so seen were not in mature fruit, and exact determination was impossible.

This was the first species of the *gymnopus* group to be described, making its appearance in 1805, simultaneously with, but placed before *C. zeylanica* Willd. As *C. compressa* (the identity is very probable, but not quite certain), it was again described in 1815. *C. haitensis* appeared in 1826, *C. indica* in 1827, *C. verticillata* in 1832, *C. armata* and *C. polyphylla* in 1835. No species of the group has ever been found in Europe, but as the other continents were explored botanically each yielded new forms, all closely allied, but still a little different. At first Braun believed that they could be kept specifically distinct, but by 1844 he changed his views and ranked them as subspecies, choosing as the specific name *C. polyphylla*, which thus in his hands temporarily acquired a wider meaning, only to drop out of nomenclature altogether, except as a synonym. In 1847, casual reference is made by Braun to a *C. gymnopus*, in 1849 this is located as Egyptian, but no description appeared before 1868, when the name was published with a double sense. First the Egyptian plant is given this name and then reduced in a note to varietal rank, and *Chara gymnopus* extended to cover all triply corticated plants having the lowest leaf-internodes uncorticated. If any regard at all is given to priority of publication, *C. gymnopus* is antedated by 63 years, and numerous names. Yet H. and J. Groves seem to be the only writers who do not use it to-day, their choice being *C. zeylanica*. If, as here, the units are considered to be species, much of the nomenclatural difficulty vanishes.

Allen, at first following Braun, accepted all forms as varieties of *C. gymnopus*, later he emphatically asserted their specific rank, finally he seems to have reverted to his original position.

43. Chara haitensis Turpin, Dict. Sci. Nat. Veg. Acot. *pl. 101*. (Livr. **40**: *pl. 1*). 1826

C. polyphylla A. Br. Flora **18**: 70. 1835.
C. Michauxii A. Br. Am. Jour. Sci. **46**: 93. 1844.

C. polyphylla Michauxii A. Br. Boston Jour. Nat. Hist. **5**: 264. 1845.

C. (*polyphylla*) *Michauxii* A. Br. Monatsber. K. Akad. Wissensch. Berlin **1858**: 362. 1858.

C. gymnopus Michauxii A. Br.; Allen, Char. Am. 2. 1880.

C. polyphylla A. Br. Am. Jour. Sci. **46**: 93. 1844; and subsequent publications before 1868, in part only.

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, including that between the uncorticated basal and the lowest of the corticated leaf-internodes: 10–40 cm. high, bright-green to grayish, lightly to heavily incrusted, robust; stems 0.9–1.4 mm. in diameter, triply corticated; spine-cells few except on youngest internodes, 0.15–0.7 mm. long: stipulodes forming a double whorl at each node, those in the upper whorl 0.5–1 mm. long, linear to lanceolate, not exceeding and usually considerably shorter than the uncorticated basal leaf-internodes: leaves 12–16 in a whorl, 2–4 cm. long, usually containing 10–13 internodes, all the latter triply corticated except the basal one, and the apical cell, which are uncorticated; leaflets at all nodes greatly reduced, 0.15–0.3 mm. long, usually near the lower limit, or much more rarely those at the uppermost leaf-nodes 0.5 mm. long, as bracteoles the anterior pair 0.5–1.2 mm. long, always shorter than the sporocarps, posterior bracteoles greatly reduced or obsolete, usually 0.08–0.2 mm. long, very rarely somewhat longer: sporocarps 0.98–1.4 mm. long, 0.63–0.75 mm. wide; oöspores 0.6–0.9 mm. long, 0.35–0.56 mm. wide, with 12–16 striae; whorl of crown-cells 0.16–0.19 mm. high, 0.17–0.25 mm. wide at base, the individual cells lanceolate, erect or appressed, sometimes early deciduous.

Type locality: Haïti.

Distribution: Illinois and Virginia to Mexico, the West Indies and South America.

Illustrations: Dict. Sci. Nat. *loc. cit.*; Kütz. Tab. Phyc. **7**: *pl. 77. f. 2.*

Exsiccatae: Allen, Char. Am. Exsicc. *9*, from Harper's Ferry, Virginia, and Mount Carmel, Illinois.

There seem to be two forms in this, represented by the two specific names by which the species was first known, *C. haitensis* having somewhat longer leaflets and posterior bracteoles than *C. polyphylla*. The extreme forms are fairly distinct, but there is considerable variation on single plants and many intermediates occur. Still longer leaflets and bracteoles would bring the plant within the limits of *C. foliolosa*, and this in turn links though not closely with *C. elegans*. More difficult are some forms most frequent in the Mississippi valley, which lie between typical *C.*

polyphylla and *C. trichacantha*, and are here doubtfully assigned to the former. They may not unlikely prove different from both. *C. haitensis* is well represented by Nash & Taylor, *no. 1470*, San Michel to Marmelade, Haïti, August 6, 1905.

44. **Chara conjungens** (A. Br.)

C. (*polyphylla*) *conjungens* A. Br. Monatsber. Königl. Akad. Wissensch. Berlin **1858**: 363. 1858.

C. gymnopus conjungens A. Br. (; Allen, Char. Am. 2. 1880; name only) Fragm. Monogr. Char. 94. 1882.

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, the lowest at that between the lowest and second of the corticated leaf-internodes: 15–50 cm. high, light- or bluish-green, moderately incrusted; stems 0.63–1.5 mm. in diameter, triply corticated; spine-cells 0.3–1.5 mm long: stipulodes forming a double whorl at each node, those in the upper whorl 0.7–0.82 mm. long, equaling or exceeding the uncorticated basal leaf-internode; stipulodes of lower whorl 0.44–0.62 mm. long: leaves 11–14 in a whorl, 1–2 cm. long, containing 9–12 internodes, all triply corticated, except the uncorticated basal one and the leaf-tip, which also is uncorticated, the uncorticated basal internode 1–1½ times as long as wide; leaflets at sterile nodes 0.16–0.23 mm. long, those at the lowest leaf-node ventricose, different from those at succeeding nodes, as bracteoles the anterior 0.96–1.2 mm. long, the posterior 0.12–0.23 mm. long: antheridia 0.35–0.4 mm. in diameter; sporocarps 1.1–1.24 mm. long; oöspores 0.72–0.78 mm. long, 0.48–0.54 mm. wide, with somewhat connivent crown-cells.

Type locality: Caracas, Venezuela.

Distribution: Texas to South America.

The measurements given above are taken in part from Braun's descriptions, partly from Müller *no. 354*, Orizaba, Mexico. Plants more or less referable here have been collected from as far north as Lake Erie. They are probably better placed with *C. haitensis*, and may be distinct from both. No South American material of this species has been available for examination.

45. Chara indica Bertero; Spreng. Syst. Veg. **4**[1]: 346. 1827

C. polyphylla guadeloupensis A. Br. Boston Jour. Nat. Hist. **5**: 264. 1845.

C. polyphylla Berteroi A. Br.; Kütz. Tab. Phyc. **7**: 24. *pl. 57. f. 1.* 1857.

C. polyphylla subglabra Kütz. *loc. cit.* 30. *pl. 76. f. 2.* 1857.

C. (*polyphylla*) *Berteroi* A. Br.; Monatsber. Königl. Akad. Wissensch. Berlin **1858**: 364. 1858.

C. gymnopus Berteroi A. Br. (; Allen, Bull. Torrey Club 7 : 107. 1880 ; name only) Fragm. Monogr. Char. 195. 1882.

Monoecious, the antheridia and oögonia borne upon the same leaf-nodes, the lowest at that between the first and second lowest corticated leaf-internodes : elongated, light-green, slightly incrusted ; stems 0.7–1 mm. in diameter, very regularly triply corticated, the cortical cells very long, at least on mature internodes, the end walls of the secondary cells very oblique, thus interposing a third cell between two consecutive primaries, though for a comparatively short distance ; spine-cells 0.25–0.82 mm. long : stipulodes forming a double whorl at each node, those in the upper whorl 0.5–1.1 mm. long, usually slightly exceeding the uncorticated basal internode of the leaves, stipulodes of lower whorl 0.25–0.55 mm. long : leaves 10–15 in a whorl, 1.2–2 cm. long, containing 8–13 internodes, all triply corticated except the tip and the basal one, which are uncorticated, basal uncorticated internode much shorter than the succeeding ones, its length about equal to its diameter ; very exceptionally the entire leaf uncorticated ; leaflets at sterile nodes greatly reduced, mostly 0.08–0.2 mm. long, the anterior usually a little the longer, as bracteoles the anterior well developed, 0.96–1.4 mm. long, but the posterior very short, 0.08–0.16 mm. long, the anterior reaching about as far as the tops of the mature sporocarps, or often a little less, but overtopping immature sporocarps : antheridia 0.42–0.47 mm. in diameter ; sporocarps 0.85–1.25 mm. long, 0.5–0.65 mm. wide ; oöspores 0.57–0.68 mm. long, 0.35–0.45 mm. wide, with 8–10 striae ; whorl of crown-cells 0.19–0.23 mm. high, 0.21–0.25 mm. wide at base, the individual cells lanceolate, connivent.

Type locality : Guadeloupe, West Indies.

Distribution : Bermuda to South America ; Mexico, and Guatemala.

Illustrations : Kütz. *loc. cit.*

46. Chara trichacantha (A. Br.)

C. gymnopus trichacantha A. Br. (; Allen, Char. Am. 2. 1880 ; name only) Fragm. Monogr. Char. 190. 1882.

Monoecious, the antheridia and oögonia borne on the same leaf-nodes : 15–30 cm. high, pale-green, glistening, slightly incrusted ; stems 0.5–0.75 mm. in diameter, somewhat irregularly triply corticated ; spine-cells variable, 0.24–0.8 mm. long, with an extreme diameter at base of 0.07 mm. : stipulodes forming a double whorl at each node, those in the upper whorl 0.63–0.88 mm. long and 0.08–0.1 mm. wide, slightly exceeding the uncorticated basal leaf-internodes ; stipulodes of lower whorl 0.44–0.49 mm. long : leaves 12 or 13 in a whorl, 1.5–2 cm. long, containing 12–15 internodes, all except the tip and the basal one uncorticated, the latter about

0.47–0.5 mm. long, 0.28–0.35 mm. wide; leaflets at sterile nodes greatly reduced, 0.05–0.16 mm. long, or almost obsolete at the upper nodes, lanceolate to ovate, sometimes ventricose, those on the node between the uncorticated basal and the lowest of the corticated internodes 0.16–0.26 mm. long, ovate, mostly ventricose, usually spreading or even reflexed, as bracteoles the anterior 0.56–0.77 mm. long, not exceeding the sporocarps, the posterior 0.04–0.21 mm. long: antheridia 0.28–0.37 mm. in diameter; the doubtfully mature sporocarps examined 0.84–0.91 mm. long, 0.56–0.6 mm. wide; oöspores 0.63–0.65 mm. long, 0.4–0.58 mm. wide, with 12–14 striae (oöspores according to Braun 0.6–0.66 mm. long, 0.46–0.52 mm. wide, with 14 or 15 striae); whorl of crown-cells 0.12–0.16 mm. high, 0.16–0.21 mm. wide, the individual cells lanceolate, diverging.

Type locality: Main canal or Comanche Creek, southwestern Texas.

Distribution: Texas to South Carolina and Florida, according to Braun and Allen. Several plants referred here by them, however, belong to *C. sejuncta*, others are young stages of *C. foliolosa*.

47. **Chara Brittonii** Allen, sp. nov. (Britton, Cat. Pl. N. J. 356. 1889; without description)

Monoecious, but the antheridia and oögonia usually though not always at different leaf-nodes: possibly allied to *C. sejuncta* A. Br.; 1–2 cm. high, cespitose, slightly incrusted; stems 0.2–0.6 mm. in diameter, different internodes varying greatly, entirely without cortex and spine-cells: stipulodes forming a double whorl at each node, usually of nearly equal size, 0.9–1.2 mm. long, 0.04–0.06 mm. wide, or those in the upper row sometimes much longer, attaining a maximum length of 2 mm., sometimes also very short: leaves 7–9 in a whorl, 5–8 mm. long (the whorls overlapping), 0.16–0.25 mm. wide, containing 4 or 5 articulations, the node-cells small and apparently sometimes absent; lowest leaf-internode often oval, broader than the rest, resembling that of many species of the *gymnopus* group; leaflets at sterile nodes usually unequal, 0.3–1.2 mm. long, or like the bracteoles, the latter 0.7–1.8 mm. long, 0.035–0.06 mm. wide, far exceeding the sporocarps: antheridia 0.25–0.28 mm. in diameter; mature sporocarps 0.85–0.93 mm. long, 0.6–0.65 mm. wide; oöspores 0.6–0.65 mm. long, 0.4–0.47 mm. wide, with 14 striae; crown-cells ovate, 0.08–0.11 mm. high, closely connivent.

Type collected 2 miles southwest of Sparta, Sussex County, New Jersey, by N. L. Britton, September 16, 1887; in the herbarium of the New York Botanical Garden.

Distribution: Only known from original collection.

Illustration: Allen, Char. Am. *pl. 53*, as "Britton's *Chara*."

48. **Chara formosa** sp. nov.

Monoecious, but the antheridia and oögonia borne at different leaf-nodes: 4–30 cm. high, slightly incrusted; stems 0.4–1 mm. in diameter, very regularly triply corticated, spine-cells only conspicuous on youngest internodes, 0.2–0.5 mm. long: stipulodes forming a double whorl at each node, those in the upper 0.6–0.92 mm. long, much exceeding the uncorticated internode basal of the leaves, stipulodes of the lower whorl 0.23–0.53 mm. long: leaves 10–15 in each whorl, 1.2–2.5 cm. long, containing 11 or 12 internodes, all triply corticated except the lowest one and the apical cell, which are uncorticated, the uncorticated basal internode 0.2–0.35 mm. long, cylindric; leaflets at sterile nodes 0.25–0.6 mm. long, not conspicuously different, but the anterior usually somewhat the longer, as bracteoles usually with two longer pairs enveloping the sporocarp, and two smaller posterior pairs, the anterior pair 1–2.5 mm. long, the second (lateral) pair sometimes equaling the anterior but more often somewhat shorter, both pairs much exceeding the sporocarps, the posterior pairs 0.23–0.5 mm. long: antheridia 0.28–0.38 mm. in diameter; sporocarps 0.92–0.96 mm. long, 0.47–0.49 mm. wide; oöspores 0.75–0.82 mm. long, 0.38–0.44 mm. wide, with 14–16 very faint striae; whorl of crown-cells 0.1–0.14 mm. high, 0.12–0.21 mm. wide at base, the individual cells lanceolate, usually spreading.

Type collected at Panther Pond, New Jersey, by T. F. Allen, August 1, 1880; in the herbarium of the New York Botanical Garden.

Distribution: New Jersey to Iowa.

49. Chara sejuncta A. Br. Boston Jour. Nat. Hist. 5: 264. 1845

C. sejuncta brevibracteata A. Br. *loc. cit.*

Monoecious, but the antheridia and oögonia almost invariably at different leaf-nodes: 8–60 cm. high, only slightly incrusted; stems 0.25–0.96 mm. in diameter, very regularly triply corticated; spine-cells scattered on lower internodes, but usually somewhat crowded above, 0.09–0.37 mm. long: stipulodes forming a double whorl at each node, those in the upper whorl 0.56–0.82 mm. long, usually considerably longer than the uncorticated basal internodes of the leaves, and concealing the true character of the latter, stipulodes of lower whorl usually 0.26–0.32 mm. long: leaves 9–13 in a whorl, 1.2–4 cm. long, containing 10–15 internodes, all of which are triply corticated except the basal one and the apical cell, which are uncorticated, the uncorticated basal internode 0.25–0.5 mm. long, not or but slightly wider than the succeeding corticated ones; leaflets at sterile nodes 0.1–0.5 mm. long, usually nearer the lower limit and

then often nearly equal on all sides of the leaf, when of greater length the anterior usually much exceeding the posterior, as bracteoles not more than two pairs well developed, often only one pair, 0.6–0.92 mm. long, closely investing the sporocarps, all shorter than the latter when mature, the posterior very short or reduced to papillae: antheridia 0.3–0.48 mm. in diameter; mature sporocarps 0.96–1.26 mm. long, 0.5–0.68 mm. wide; oöspores 0.66–0.91 mm. long, 0.42–0.6 mm. wide, with 12–15 striae; whorl of crown-cells 0.12–0.26 mm. high, 0.18–0.26 mm. wide at base, the individual cells lanceolate, rounded at the apex, spreading, often very widely.

Type locality: Lakes in the lowlands of the Mississippi, Illinois, opposite St. Louis, Missouri.

Distribution: Massachusetts and Alabama to Minnesota and Mexico; also reported from South America.

Illustration: Woods, Flor. Neb. 1: *pl. 36.*

Exsiccatae: Allen, Char. Am. Exsicc. *7, 25, 39.*

50. Chara compacta sp. nov.

C. sejuncta Allen, Bull. Torrey Club **21**: 526. 1894.

Monoecious, but the antheridia and oögonia at different leaf-nodes: 15–20 cm. high, slightly incrusted; stem 0.75–1 mm. in diameter, very regularly triply corticated; spine-cells almost wanting on lower internodes, more frequent above, 0.23–0.37 mm. long: stipulodes forming a double whorl at each node, those in the upper whorl 0.92–1.5 mm. long, usually not quite reaching the top of the swollen basal internodes of the leaves, stipulodes of the lower whorl 0.37–0.5 mm. long: leaves 12–14 in a whorl, 1.5–2.2 cm. long, containing 12–14 internodes, all of which are triply corticated except the basal one and the apex, which are uncorticated, the uncorticated basal internode barrel-shaped, 0.7–0.88 mm. long; leaflets at the sterile nodes 0.16–0.24 mm. long, the anterior and posterior usually nearly equal, as bracteoles two pairs usually well developed, of nearly equal length or the anterior one-half longer, and one, very rarely two more pairs less so, but usually evident, the former 0.6–1.12 mm. long, the latter 0.2–0.48 mm. long, all shorter than the sporocarps: antheridia 0.36–0.4 mm. in diameter; sporocarps 1.12–1.28 mm. long, 0.6–0.77 mm. wide, the envelope unusually thick; oöspore 0.73–0.77 mm. long, 0.48–0.55 mm. wide, with 10–12 very conspicuous striae; whorl of crown-cells 0.21–0.25 mm. high, 0.3–0.32 mm. wide at base, the individual cells ovate, beaked.

Type collected in Lake Saratoga, New York, by T. F. Allen, August, 1894; in the herbarium of the New York Botanical Garden.

Distribution: Lakes Champlain and Saratoga.

Exsiccatae: Allen, Char. Am. Exsicc. as *C. sejuncta*, from both the localities named, but without number.

SPECIES DUBIAE VEL EXCLUDENDAE

C. capitata Elliott, Sketch Bot. S. Car. Georg. **2**: 516. 1824. (Not *C. capitata* Nees) = *C. capitellata* A. Br. Am. Jour. Sci. **46**: 93. 1844 = *C. Elliottii* A. Br. nomen = *Nitella capitellata* A. Br.

C. flexilis A. Br. Am. Jour. Sci. **46**: 92. 1844. = *Nitella flexilis* Ag.

C. glabra Muhl. Cat. Pl. Am. Sept. 82. 1813. = ?

C. glomerulifolia A. Br. Am. Jour. Sci. **46**: 92. 1844. = *Nitella glomerulifera* A. Br.

C. humilis Riddell, Flor. W. States. 110. 1835. = ? *C. fragilis*.

C. mucronata americana? A. Br. Am. Jour. Sci. **46**: 92. 1844. = *Nitella* sp.

C. sabulosa Riddell, *loc. cit.* = ? *C. haitensis*.

C. sabulosa spiralis Riddell, *loc. cit.* = ?

C. squamosa? Riddell, *loc. cit.* 109 = ?

C. tenuis Muhl. Cat. Pl. Am. Sept. 82. 1813. = *Nitella flexilis* prob., *fide* MS. note by Braun.

C. tenuissima A. Br. Am. Jour. Sci. **46**: 93. 1844. = *Nitella tenuissima* Kütz.

C. tenuissima americana A. Br. Boston Jour. Nat. Hist. **5**: 264. 1845. = *Nitella tenuissima americana* A. Br.

BIBLIOGRAPHY OF CHARACEAE, WITH SPECIAL REFERENCE TO AMERICA

Agardh, C. A. Systema Algarum. 1 vol. 1824.
Two species of Chara recorded from America.

Agardh, C. A. Ueber die Anatomie und den Kreislauf der Charen. Nov. Act. Caes. Leop. **13**: 113–162. *pl. 10.* 1826.

Allen, T. F. Characeae. Bull. Torrey Club **2**: 9, 10. 1871.

Allen, T. F. Characeae americanae, illustrated and described. (Published by the author.) Part 1: *pl. 1*, with text. New York. [1879.] Part 2: *pl. 2*, with text. New York. [1879.]

Allen, T. F. The Characeae of America. Part 1: 1–8. *pl. 1–3.* Boston. [1880.] Part 2: 9–14. *pl. 4–6.* Boston. [1880.]

Allen, T. F. Similarity between the Characeae of America and Asia. Bull. Torrey Club **7**: 105–107. 1880.

Allen, T. F. Development of the cortex in Chara. Bull. Torrey Club **9**: 37–47. *pl. 15–22.* 1882.

Allen, T. F. Observations on some American forms of *Chara coronata*. Am. Nat. **16**: 358–369. *pl. 4* + *f. 1, 2, 4–11.* 1882. (Also reprinted. 1–12. *pl.* + *f. 1, 2, 4–11.* 4to.)

Allen, T. F. Notes on the Characeae of Lawlor's Lake (Lacustrine Formation of Torryburn Valley). Bull. Nat. Hist. Soc. New Brunswick 1^2: 14, 15. *f. 1–22.* 1883.

Allen, T. F. Notes on the American species of Tolypella. Bull. Torrey Club 10 : 109–117. *pl. 37–42.* 1883.

Allen, T. F. Charas or stoneworts. (Characeae.) Bot. Gaz. 11 : 141. 1886. [Illust.]

Allen, T. F. Some Notes on Characeae. Bull. Torrey Club 14 : 211–215. *pl. 71–75.* 1887.

Allen, T. F. Dredge for Chara. Bot. Gaz. 12 : 297. 1887. [Illust.]

Allen, T. F. *Nitella* (not *Tolypella*) *Macounii.* Bull. Torrey Club 15 : 11. 1888.

Allen, T. F. Characeae. In **Britton, N. L.** Catalogue of plants found in New Jersey. Final Rep. State Geol. N. J. 2 : 356, 357. 1889.

Allen, T. F. The Characeae of America. (Published by the author.) New York, 1888–1896. Part 1 : 1–64. *f. 1–54.* 1888. Part 2, Fasc. 1 : 1–8. *14 unnumbered plates.* [1892.] Part 2, Fasc. 2 : 9–17. *8 unnumbered plates.* 1894. Part 2, Fasc. 3 : 19–28. *9 unnumbered plates.* 1896. (Plates from drawings by the late Evelyn Hunter Nordhoff. One edition of part 2, fasc. 3, appeared with the plates printed on heavy paper and another set on Japanese paper. The latter was paged 1–42 consecutively with the plates.)

Allen, T. F. Note on some Characeae. Bull. Torrey Club 19 : 230. 1892.

Allen, T. F. Notes on new Characeae. Bull. Torrey Club 20 : 119, 120. 1893.

Allen, T. F. Note on some Characeae. Bull. Torrey Club 20 : 258. 1893.

Allen T. F. Remarks on *Chara gymnopus* A. Br., with descriptions of new species of Chara and Nitella. Bull. Torrey Club 21 : 162–167. *pl. 185–192.* 1894.

Allen, T. F. Japanese Characeae, I. Bull. Torrey Club 21 : 523–526. 1894.

Allen, T. F. Note on *Chara sejuncta* A. Br. Bull. Torrey Club 21 : 526. 1894.

Allen, T. F. Japanese Characeae, II. Bull. Torrey Club 22 : 68–71. 1895.

Allen, T. F. *Nitella subspicata* sp. nov. Bull. Torrey Club 23 : 6–7. *pl. 253.* 1896.

Allen, T. F. A new species of Nitella belonging to the *N. flexilis* series, with a review of the allied species. Bull. Torrey Club 23 : 533. *pl. 284.* 1896.

Allen, T. F. New species of Nitella belonging to the monoecious acuminatae group, with a review of the allied species. Bull. Torrey Club 23 : 534–536. *pl. 285, 286.* 1896.

Allen, T. F. Contributions to Japanese Characeae, III. Bull. Torrey Club 25 : 73–82. 1898. (Contributions to Japanese Characeae, I–III, were also reprinted, repaged 1–18 with *24 unnumbered plates* from drawings by Evelyn Hunter Nordhoff. The plates appeared only with the reprints, of which there were two editions, one octavo, with the plates on heavy paper, the other small quarto, with the plates on Japanese paper.

Allen, T. F. Three new Charas from California. Bull. Torrey Club 27 : 299–304. *pl. 10–15.* 1900.

Barton, W. P. C. Compendium florae philadelphicae: containing a description of the indigenous and naturalized plants found within a circuit of ten miles around Philadelphia. 2 vols. 1818.
Includes *C. vulgaris.*

Bennett, A. W. On the structure and affinities of Characeae. Jour. Bot. 16: 202–207. 1878.

Bennett, A. W. A few last words on Chara. Jour. Bot. 17: 67–69. 1879.

Bennett, J. L. Plants of Rhode Island. i–xiii, 1–128. 1888.
Five species of Chara and 3 of Nitella reported.

Bigelow, J. Florula bostoniensis. A collection of plants of Boston and its vicinity. Ed. 2. 1–423. 1824; ed. 3. i–vii. 1–468. 1840.
One species of Chara described.

Bischoff, G. W. Die kryptogamischen Gewächse mit besonderer, berücksichtigung der flora Deutschlands und der Schweiz. Chareen. 1–26. *pl. 1, 2.* 1828.

Botanical Seminar of the University of Nebraska. Additions to the reported flora of Nebraska made during 1893. Bot. Surv. Neb. 3: 5–20. 1894.
One species and one form of Nitella, and 3 species of Chara reported.

Braun, A. Esquisse monographique du genre Chara. Ann. Sci. Nat. II. 1: 349–357. 1834.
Two species credited to America.

Braun, A. Uebersicht der genauer bekannten Chara-Arten. Flora 18: 49–73. 1835.
Three species credited to America.

Braun, A. Ueber den gegenwärtigen Stand seiner monographischen Bearbeitung der Gattung Chara. Flora 22: 308–311. 1839.
Eleven species known from North, and 12 from South America.

Braun, A. A brief notice of the Charae of North America. Am. Jour. Sci. 46: 92, 93. 1844.

Braun, A. [Additional notices of the North American Charae.] In **Engelmann, G., & Gray, A.** Plantae Lindheimerianae. Boston Jour. Nat. Hist. 5: 264. 1845.

Braun, A. Charae australes et antarcticae, or characters and observations on the Characeae of Australia and the southern circumpolar regions. Hook. Jour. Bot. & Kew. Gard. Misc. 1: 193–203. 1849.

Braun, A. Characeae Indiae orientalis et insularum maris pacifici; or characters and observations on the Characeae of the East Indian continent, Ceylon, Sunda Islands, Marians, and Sandwich Islands. Hook. Jour. Bot. & Kew. Gard. Misc. 1: 292–301. 1849.

Braun, A. Uebersicht der schweizerischen Characeen. 1–23. 1849. (Reprinted from Neue Denks. Allg. Schw. Ges. 10: —. 1849.)

Braun, A. Plantae Muellerianae. Characeae. Linnaea 25: 704–709. 1852.

Braun, A. Ueber die Richtungsverhältnisse der Saftströme in den Zellen der Characeen. Monatsber. K. Akad. Wissensch. Berlin 1852: 220–268. 1852; 1853: 45–76. 1853.

Braun, A. Characeen aus Columbien, Guyana, und Mittelamerika. Monatsber. K. Akad. Wissensch. Berlin 1858: 349–368. 1858.

Braun, A. Conspectus systematicus Characearum europaearum. 1–8. 1867.

Braun, A. Die Characeen Afrika's. Monatsber. K. Akad. Wissensch. Berlin 1867 : 782–872. 1868.

Braun, A. Characeen. (Armleuchter-Gewächse). In **Cohn,** Krypt. Fl. Schles. 1 : 353–411. 1876.

Braun, A. Fragmente einer Monographie der Characeen. Nach der hinterlassen Manuscripten A. Braun's herausgegeben von Dr. Otto Nordstedt. 1–211. *pl. 1–7.* 1882. (Reprinted from Abh. K. Akad. Wissensch. Berlin.)

Britton, E. G. The Jenman collection of ferns. Jour. N. Y. Bot. Gard. 4 : 85, 86. 1903.
Includes Chara and Nitella.

Britton, N. L. The Morong herbarium. Jour. N. Y. Bot. Gard. 2 : 35–37. 1901.

Bruzelius, A. Observationes in genus Charae. 1–24. 1824.

Caruel, T. On the place of Characeae in the natural system. Jour. Bot. 16 : 258, 259. 1878.

Celakovsky, L. Ueber die morphologische Bedeutung der sog. Sporensprösschen der Characeen. Flora 61 : 49–57, 73–76. 1878.

Coker, W. C. Vegetation of the Bahama Islands. In **Shattuck,** Bah. Is. 185–270. *pl. 1, 33–47.* 1905.
Two Charas reported.

Coville, F. V. Botany of the Death Valley Expedition. Contr. U. S. Nat. Herb. 4 : 1–363. *pl. 1–21.* 1893.
Two species of Chara reported.

Cragin, F. W. Note on collection of Characeae, and their distribution in Kansas. Bull. Washburn Col. Lab. 1 : 188. 1886.

Dame, L. L., & Collins, F. S. Flora of Middlesex County, Massachusetts. 1–201. 1888.
Seven species of Nitella and four species or varieties of Chara reported.

Day, D. F. The plants of Buffalo and its vicinity. Bull. Buff. Soc. Nat. Sci. 4 : 65–254. 1882–1883.
Two species of Chara and one of Nitella reported.

De Bary, A. Ueber den Befruchtungsvorgang bei den Charen. Monatsber. K. Akad. Wissensch. Berlin 1871 : 227–239. *1 pl.* 1871.

De Bary, A. Zur Keimungsgeschichte der Charen. Bot. Zeit. 33 : 377–385, 393–401, 409–420. *pl. 5, 6.* 1875.

Dictionnaire des Sciences Naturelles. 61 vols. text, 11 vols. plates. 1816–1830.
Chara haitensis figured.

Dudley, W. R. Chara and Nitella found in midwinter. Am. Mo. Micr. Jour. 4 : 58, 59. 1883.

Eaton, A. A manual of botany for the Northern States. 1817; ed. 2. 1818; ed. 3. 1822; ed. 4. 1824; ed. 5. 1829; ed. 6. 1833; ed. 7. 1836.
Two species recognized in the first edition, three in the second, four in the third and fourth, five in the fifth and sixth, seven in the seventh.

Eaton, A., & Wright, J. North American Botany. 1840.
Seven species reported.

Eaton, D. C. Characeae. In **Watson,** Bot. U. S. Geol. Expl. Fortieth Parallel 5 : 398. 1871.
Two species of Chara and 1 of Nitella reported.

Elliott, S. Sketch of the botany of South Carolina and Georgia. 2 vols. 1816–1824.
Contains description of *C. capitata* Ell.

Frost, C. C. Characeae. In **Tuckerman, E., & Frost, C. C.** A catalogue of plants growing without cultivation within thirty miles of Amherst College. 1875.
Five species of Nitella and 2 of Chara.

Gay, C. Historia fisica y politica de Chile. Botanica. 6 vols. 1845–1854.
Chara clavata described.

Giesenhagen, K. Untersuchungen über die Characeen. 1–145. *pl. 1–3. f. 1–59.* 1902.

Gmelin, C. C. Flora badensis alsatica. 4 vols. 1806–1826.
Contains original description of *Chara Braunii.*

Goebel, K. Morphologische and biologische Bemerkungen. II. Ueber Homologien in der Entwickelung männlicher und weiblicher Geslechtsorgane. 1. Characeen. Flora 90 : 282–295. *f. 1–8.* 1902.

Goetz, G. Ueber die Entwickelung der Eiknospe bei den Characeen. Bot. Zeit. 57 : 1–13. *pl. 1.* 1899.

Groves, H. & J. A review of the British Characeae. Jour. Bot. 18 : 97–103, 129–135, 161–167. *pl. 207–210.* 1880.

Groves, H. & J. On Characeae collected by Mr. T. B. Blow, F. L. S., in the West Indies. Jour. Linn. Soc. 33 : 323–326. *pl. 19.* 1898.

Halsted, B. D. Classification and description of the American species of Characeae. Proc. Boston Soc. Nat. Hist. 20 : 169–190. 1879.

Hicks, G. H. New and rare Michigan plants. Asa Gray Bull. 1^3: 10–12. 1893.
Mentions a new variety of *Chara gymnopus*, doubtless *C. Hicksii* Allen.

Hitchcock, A. S. List of cryptogams collected in the Bahamas, Jamaica, and Grand Cayman. Rep. Missouri Bot. Gard. 9 : 111–120. 1898.
One species of Chara reported.

Holzinger, J. M. List of plants collected by C. S. Sheldon and M. A. Carleton in Indian Territory in 1891. Contr. U. S. Nat. Herb. 1 : 189–219. 1892.
One species of Chara included.

Howe, M. A. The Allen collection of Characeae. Jour. N. Y. Bot. Gard. 2 : 52–54. 1901.

Humboldt, A. von. See Kunth.

Hy, F. C. Sur les modes de ramification et de cortication dans la famille des Characées, et les caractères qu'ils peuvent fournir a la classification. Bull. Soc. Bot. France II. 11 : 393–398. 1889.

Itzigsohn, H. Charologisches. Bot. Zeit. 8 : 337–340. 1850.

Johow, F. Die Zellkerne von *Chara foetida.* Bot. Zeit. 39 : 729–743, 745–753. *pl. 7.* 1881.

Kaiser, O. Ueber Kerntheilungen der Characeen. Bot. Zeit. 54 : 61–79. *pl. 2.* 1896.

Kaulfuss, G. F. Erfahrungen über das Keimen der Charen, nebst andern Beiträgen zur Kenntniss dieser Pflanzengattung. 1–92. *1 pl.* 1825.

Kellerman, W. A., & Werner, W. C. Botany. Geol. Ohio 7^2: 56–406. 1895.
One species of Nitella and 7 of Chara reported.

Kunth, C. S. Voyage de Humboldt et Bonpland. Sixième partie. Botanique. Nova Genera et Species Plantarum. 7 vols. 1815–1825.
Contains at 1 : 45, description of *Chara compressa*, the first separation of Characeae as a family (by headline only), and a footnote by Humboldt on distribution.

Kützing, F. T. Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange. 1 vol. 1843.

Kützing, F. T. Tabulae phycologicae, oder Abbildungen der Tange. 19 vols. text and plates, 1 vol. index. 1845–1871.

Kützing, F. T. Species Algarum. 1 vol. 1849.

Lefroy, J. H. The botany of Bermuda. Bull. U. S. Nat. Mus. 25 : 35–141. 1884.
One species of Chara reported.

Leonhardi, H. von. Die böhmischen Characeen. 1–20. (Reprinted from Lotos 13 : —. 1863.)

Linné, C. Species plantarum. 2 vols. 1753.
Four species of Chara recognized.

MacMillan, C. Observations on the distribution of plants along shore at Lake of the Woods. Minn. Bot. Stud. 1 : 949–1023. *pl. 70–81.* 1897.
Chara found in strand-pools.

Migula, W. Die Characeen Deutschlands, Oesterreichs und der Schweiz. In **Rabenhorst, L.** Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. Ed. 2. 5 : 1–765. *f. 1–149.* 1890–1897.

Migula, W. Synopsis Characearum europearum. 1–176. *f. 1–133.* 1898.

Millspaugh, C. F. Second contribution to the coastal and plain flora of Yucatan. Publ. Bot. Field Columb. Mus. 1 : 281–339. *pl. 8–21.* 1896.
One species of Chara reported.

Millspaugh, C. F. Third contribution to the coastal and plain flora of Yucatan. Publ. Bot. Field Columb. Mus. 1 : 343–410. 1898.
One species of Chara reported.

Mohr, C. Plant life of Alabama. Contr. U. S. Nat. Herb. 6 : 1–921. 1901.
Eight species, varieties and forms of Chara and Nitella reported.

Muhlenberg, H. Catalogus plantarum Americae septentrionalis, huc usque cognitarum indigenarum et cicurum : or a catalogue of the hitherto known native and naturalized plants of North America. 1813 : ed. 2. 1818.
Four species of Chara listed without description.

Nelson, A. First report on the flora of Wyoming. Sixth Ann. Rep. Agric. Coll. Univ. Wyo. & Wyo. Agric. Exper. Sta. 1896 : 47–218. 1896.
Two species of Chara reported.

Noll, H. R. Flora of Pennsylvania, and botanist's pocket manual. 1851.
Contains short illustrated article on Characeae.

Nordstedt, O. Några iakttagelser öfver Characeernas groning. Lunds Univ. Arsskr. 2 : 1–12. *pl.* 1865.

Nordstedt, O. De Algis et Characeis. 1, 2. Lunds Univ. Arsskr. 16 : 1–20. *pl. 1.* 1880 ; 3–6. *loc. cit.* 25 : 1–41. *pl. 1.* 1889.

Nordstedt, O. See **Braun.** Fragmente einer Monographie der Characeen.

Nordstedt, O. Einige Characeenbestimmungen. Hedwigia 27: 181–194. 1888.

Nordstedt, O. Ueber einige Characeen aus Puerto-Rico. Hedwigia 27 : 194, 195. 1888.

Northrop, A. R. Flora of New Providence and Andros. (Bahama Islands.) Mem. Torrey Club **12** : 1–98, with map. *pl. 1–19.* 1902.
Two species of Chara reported.

Northrop, J. I. & A. R. Plant notes from Tadousac and Temiscouata County, Canada. Bull. Torrey Club **17** : 27–32. 1890.
Two species of Chara reported.

Nuttall, T. The genera of North American plants, and a catalogue of the species to the year 1817. 2 vols. 1818.
Three species of Chara included.

Oltmanns, F. Morphologie und Biologie der Algen. 2 vols. 1904, 1905.

Overton, E. Beiträge zur Histologie und Physiologie der Characeen. Bot. Centralbl. **44** : 1–10, 33–38. *pl. 1.* 1890.

Owen, M. L. A catalogue of plants growing without cultivation in the county of Nantucket, Mass. 1888.
Five species, varieties, or forms of Nitella, and 5 of Chara reported.

Peck, C. H. Characeae. Ann. Rep. State Cab. N. Y. **22** : 55. 1869.
Three species of Nitella and 4 of Chara reported.

Peck, C. H. Ann. Rep. N. Y. State Mus. Nat. Hist. **26** : 48. 1874.
Two species of Chara reported.

Peck, C. H. Ann. Rep. N. Y. State Mus. Nat. Hist. **33** : 36. 1883.
Two species of Chara reported.

Peck, C. H. Ann. Rep. N. Y. State Mus. Nat. Hist. **38** : 83, 84. 1885.
One species of Chara and 3 of Tolypella reported.

Persoon, C. H. Synopsis plantarum. 2 vols. 1805–1807.
Chara foliosa from Pennsylvania.

Philippi, R. A. Reise durch die Wueste Atacama. Florula atacamensis seu enumeratio plantarum in itinere per desertum atacamense observatarum. 1–62. *pl. 1–6.* 1860.
One species of Chara reported.

Philippi, R. A. Verzeichniss der von Friedrich Philippi auf der Hochebene der provinzen Antofagasta und Tarapacá gesammelten pflanzen. i–viii, 1–96. *pl. 1, 2.* 1891.
One species of Chara reported.

Philippi, R. A. Catalogus praevius plantarum in itinere ad Tarapaca a Friderico Philippi lectarum. Anal. Mus. Nac. Chile. Segunda Seccion. Botánica. **2** : i–viii, 1–96. *pl. 1, 2.* 1891.
One species of Chara reported.

Pieters, A. J. The plants of western Lake Erie. Bull. U. S. Fish Comm. 1901 : 57–79. *pl. 11–20.* 1901.
Eight species of Chara, 5 of Nitella, and 1 of Tolypella reported.

Pound, R., & Clements, F. E. The phytogeography of Nebraska. 1898; ed. 2. 1900.
Twelve species of Characeae occur in Nebraska.

Pringsheim, N. Ueber die Vorkeime und die nacktfüssigen Zweige der Charen. Jahrb. Wissensch. Bot. **3** : 294–324. *pl. 9–13.* 1862.

Provancher, L. Flore Canadienne ou description de toutes les plantes des forets, champs, jardins et eaux de Canada. 2 vols. 1862.
Two species of Chara described.

Pursh, F. Flora Americae Septentrionalis. 1814.
Three species of Chara described.

Ravenel, H. W. *Nitella praelonga* A. Br. Bull. Torrey Club 6 : 82. 1876.

Riddell, J. L. A synopsis of the flora of the Western States. 1–116. 1835.
Six species or varieties of Chara described.

Ridley, H. N. Notes on the botany of Fernando Noronha. Jour. Linn. Soc. 27 : 1–81. *pl.* 1–4. 1890.
One species of Nitella reported.

Robinson, J. The flora of Essex County, Massachusetts. 1–200. 1880.
Five species or varieties of Nitella and six of Chara reported.

Sachs, J. Die Characeen. Lehrbuch der Botanik, ed. 4. 295–306. 1874.

Sargent, F. L. Guide to the recognition of the principal orders of cryptogams and the commoner and more easily distinguished New England genera. 1–39. 1886.
Two genera of Characeae included.

Saunders, D. A. Papers from the Harriman Alaska Expedition, XXV. The Algae. Proc. Wash. Acad. Sci. 3 : 391–486. *pl. 43–62.* 1901.
Two species of Chara, and 2 of Nitella reported.

Schneck, J. Catalogue of the flora of the Wabash Valley below the mouth of White River, and observations thereon. Ann. Rep. Geol. Surv. Ind. 7 : 504–579. 1876.
C. polyphylla mentioned.

Setchell, W. A., & Gardner, N. L. Algae of North Western America. Univ. Calif. Publ. Bot. 1 : 165–418. *pl. 17–27.* 1903.
Two species of Chara and 2 of Nitella reported.

Sloane, H. Catalogus plantarum quae in insula Jamaica sponte proveniunt. Pars prima. 1–232. 1696.
A Jamaican plant identified with Bauhin's *Equisetum foetidum sub aqua repens.*

Sloane, H. A voyage to the islands Madera, Barbados, Nieves, S. Christophers and Jamaica. Vol. 1. 1707.
Similar reference.

Small, H. B. Botany of Bermuda. 1–52. 1900.
One species of Chara reported.

Smith, J. G., & Pound, R. Flora of the Sand Hill region of Sheridan and Cherry counties, and list of plants collected on a journey through the Sand Hills in July and August, 1892. Bot. Surv. Neb. 2 : 1–30. 1893.
Four species of Chara collected.

Smyth, B. B. Additions to the flora of Kansas. Trans. Kan. Acad. Sci. 13 : 96–103. 1893.
Two species of Chara and 1 of Nitella collected.

Spegazzini, C. Characeae platenses. Anal. Soc. Cient. Arg. 15 : 1–14. 1883.

Thuret, G. Note sur l'anthère du Chara et les animalcules qu'elle renferme. Ann. Sci. Nat. II. 14 : 65–72. *pl. 5–8.* 1840.

Thuret, G. Recherches sur les zoospores des algues et les anthéridies des cryptogames. Ann. Sci. Nat. III. 16 : 5–39. *pl. 1–15.* 1851.

Tilden, J. E. A contribution to the bibliography of American Algae. Minn. Bot. Stud. 1 : 295–421. 1895.

Tilden, J. E. List of fresh-water Algae collected in Minnesota during 1895. Geol. Nat. Hist. Surv. Minn. 1 : 597–600. 1896.
One species of Chara collected.

Vasey, G. Additions to the flora of Illinois. Trans. Ill. State Agric. Soc. 4 : 667–671. 1861.
Includes *Chara polyphylla*.

Vaucher, J. P. E. Mémoire sur les Charagnes. Mém. Soc. Phys. Genève 1 : 168–179. 1821.

Vines, S. H. The pro-embryo of Chara : an essay in morphology. Jour. Bot. 16 : 355–363. 1878.

Vines, S. H. Apospory in the Characeae. Ann. Bot. 1 : 177, 178. 1887.

Wallman, J. Försök till en systematisk uppställning af växtfamiljen Characeae. Kongl. Vet.-Akad. Handlingar **1852** : 229–331. 1854. Translated into French by **Nylander, W.**, and published as Essai d'une exposition systematique de la famille des Characées. Actes Soc. Linn. Bordeaux **21** : 1–91. 1856.

Ward, L. F. Guide to the flora of Washington and vicinity. Bull. U. S. Nat. Mus. **22** : 1–265. 1881.
Two species of Chara and 2 of Nitella reported.

Warming, E. Lagoa Santa. Et Bidrag til den biologiske Plantegeografi. Kgl. Danske Vidensk. Selks. Skr. VI. Nat. Math. 6 : 153–488. *1 pl. 43 f.* 1892.
Three species of Chara reported.

Webber, H. J. A catalogue of the flora of Nebraska. Protophyta-Anthophyta. Ann. Rep. Neb. State Board Agric. **1889** : 175–302. 1890.
Two species of Chara and 1 of Nitella reported.

Webber, H. J. Appendix to the catalogue of the flora of Nebraska. Trans. Acad. Sci. St. Louis 6 : 1–47. 1892.
Two species of Chara and 3 of Nitella reported.

Willdenow, C. L. Du genre nomme Chara. Mém. Acad. Roy. Berlin **1803** : (Cl. Phil. Exper.) 79–90. *pl. 1, 2.* 1805.
Description of *Chara foliolosa*.

Willdenow, C. L. Species plantarum. (Chara, 4 : 183–187. 1805.)
Chara foliolosa only American species mentioned.

Wille, N. Characeae. Engler & Prantl, Nat. Pfl. 1^2 : 161–175. *pl. 109–128.* 1891.

Williams, R. S. The flora of a Montana pond. Bull. Torrey Club **19** : 192–194. 1892.
Two species of Nitella and 1 of Chara reported.

Williams, R. S. A collecting trip to Bolivia. Jour. N. Y. Bot. Gard. 4 : 58–66. *f. 6, 7.* 1902.
Chara used as fodder at Lake Titicaca.

Wood, A. A class-book of botany. Ed. 2, et seq.
Six species or varities of Chara described, following Riddell.

Woods, A. F. Characeae. Fl. Neb. 1 : 122–128. *pl. 31–36.* 1894.

Wright, J., & Hall, J. A catalogue of plants, growing without cultivation, in the vicinity of Troy. 1–42. 1836.
One species of Chara reported.

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BULLETIN
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An Enumeration of the Plants Collected in Bolivia by Miguel Bang. Part 4*

With Descriptions of New Genera and Species

By Henry H. Rusby

The publication of this part completes the enumeration of all determinable specimens of Mr. Bang's Bolivian collections, with the exception of the Gramineae and a considerable number of species represented by scraps only, or by single specimens, and which do not represent distributions. Among the last are a number of undescribed species, which may be published in connection with the extensive Bolivian collections of Mr. R. S. Williams.

The determination of Bolivian grasses demands critical study by specialists, which cannot now be given them, and the publication of these plants must be deferred.

Corrections, Additions and Notes Referring to Preceding Parts

1695, "Caopia guianensis," appears to be C. viridiflora (Pl. & Tr.) Kuntze.

1718, "Clusia sp.," is

Havetiopsis glauca sp. nov.

Glabrous; branchlets short, spreading, dark-brown; leaves 4–8 cm. long, 1.5–3 cm. broad, oblanceolate or obovate, obtuse, tapering into a petiole 1–1.5 cm. long, slightly inequilateral, pale-green, thin; venation lightly-prominent both sides, the secondaries

* Parts 1–3 were published in the Memoirs of the Torrey Botanical Club, as follows:

Part 1. Mem. Torrey Club 3^3: 1–67. 1893.
Part 2. Mem. Torrey Club 4: 203–274. 1895.
Part 3. Mem. Torrey Club 6: 1–130. 1896.

about 25 pairs, ascending at an angle of about 25° with the midrib, their branches joining them at an angle of 45°; panicles sessile or short-peduncled, trichotomous, 2–4 cm. long and broad, very loose, the branches strongly angled, the angles lightly winged; bracts about 1 mm. long and rather broader, ovate, keeled, whitish, thick and rigid; pedicels similar, about 4 mm. long, 2-bracted at the middle and at the summit, thickened upward; buds subglobular, about 3 mm. broad; outer sepals 3 mm., inner 6 mm. long; petals about 5 mm. long, thick, shining, the margin obscurely crenate; united portion of filaments 1 mm. long, 1.5 mm. broad, dark-brown, the free portion of the filaments about 1.5 mm. long, the anthers 1 mm. long, obovate, brown with whitish margins.

Apparently the same as specimens collected by *Pearce*.

1489 is not "EROTIUM SUBINTEGRIFOLIUM," but a distinct species.

In the Kew herbarium the specimen of the same collected by *Pentland* is labeled "*Freziera subdimidiata* Planch.," but I cannot find that this name has been published.

1154. The authorship of CEIBA BOLIVIENSIS is Britten & Baker, not "Britten."

1362 and *1401*, "HELICTERES BARNENSIS," are

Helicteres guanaiensis sp. nov.

Finely and closely stellate-tomentose, the branchlets somewhat scurfy; stipules 6–9 mm. long, linear; petioles 1.5 cm. long, stout; blades 5–10 cm. long, 4–6 cm. broad, ovate, acute, cordate, unequally crenate-dentate, deep-green above, yellowish-green underneath, 5- to 7-costate, the ribs connected by their numerous branches; flowering pedicels 6 mm. long, slender; calyx-tube 1.25 cm. long, infundibular, the fully expanded corolla 3–4 cm. broad; gynophore 7.5 cm. long; stamen-tube bearing at the summit a short, broad funnel-form dilation about 1 mm. long, and about equaling the free portions of the filaments; anthers 2, blackish, about 1 mm. long; fruiting peduncles 3–4 cm. long, spreading and ascending; capsules 2.5–3 cm. long, 1.25 cm. broad, ovoid, obtuse, truncate at the base, closely spiral, with 2 or 3 turns. (*Nos. 1362*, type, and *1401*.)

935, "BRITTONELLA PILOSA," is MIONANDRA CAMAREOIDES Griseb. Goett. Abh. **19**: 101. 1874.

788, "GERANIUM SESSILIFLORUM," has been described as a new species, G. BANGII, by Hieronymus, in Bot. Jahrb. **21**: 314.

839, "BRUNELLIA BOLIVIANA Britton (?)," is

Brunellia rhoides sp. nov.

Younger portions and inflorescence shortly ferruginous-tomentose, the lower leaf-surfaces and midrib above tomentellate; branchlets

very stout, very coarsely angled and sulcate; petioles stout, 6–10 cm. long, deeply sulcate; rachis 1–1.5 dm. long; leaflets mostly 3 or 4 pairs, their petiolules 3–5 mm. long, very stout; blades 5–10 cm. long, 2.5–4.5 cm. broad, the lower smaller, oblong-lanceolate, inequilateral, especially at the base, mostly blunt and frequently emarginate at the apex, crenate, shining above, very pale or whitish beneath, with the venation prominent and finely reticulate, the secondaries about 20 pairs, very slender, ending almost in the sinuses in a minute apiculation; peduncles of the panicles about 4 cm. long, stout, coarsely angled, the flowering portion rather longer, almost as broad, very inequilateral, dense; buds globoidal or broader than long, strongly 5-angled, blunt, 2 mm. broad; pedicels less than 1 mm. long, stout; calyx-lobes 2 mm. long, 1.5 mm. broad, ovate, obtusish, thick, pilose; filaments 2 mm. long, thick, attenuate, the white anthers nearly 1 mm. long, very broad; pistillate flowers not seen. The same as *no. 1991*.

664, "BRUNELLIA BOLIVIANA Britton, sp. nov.," is B. OLIVERII Britton, Bull. Torrey Club **16**: 160. 1889.

Dr. Britton applied the name *B. boliviana* to Rusby's *no. 2577*, but by an inadvertence my publication referred it to Mr. Bang's specimen of *B. Oliverii*. I have thus unfortunately reduced the name "*B. boliviana*" to a synonym, and my *no. 2577* must be described under a new name.

1515, "ERYTHRINA RUBINERVIA," is E. AMASISA Spruce, Jour. Linn. Soc. **3**: 202. 1859.

1090, "CASSIA sp." is

Cassia acinacicarpa sp. nov.

Gray and densely short-tomentose throughout; branches greenish, terete, ascending, densely leafy; stipules caducous, not seen; petioles 1.5–2 cm. long, stout; rachis 2.5–3 cm. long, bearing three pairs of sessile leaflets, which are 1.5–4 cm. long, 0.6–1 cm. broad, lance-oblong, inequilateral, subrotund at the base, acute and strongly mucronate at the apex, entire, the venation obscure; peduncles 2 cm. long, about 7-flowered, slender; pedicels 2 cm. long, very slender, erect; sepals ovate, obtuse, densely long-pilose without, especially on the purple, subcarinate middle portion, lightly pilose within, the largest 7 mm. long, 4 mm. broad, the smaller 6 mm. long, 2.5 mm. broad; longer petals 12 mm. long, 5 mm. broad, the shorter 9 mm. long, 6 mm. broad, the standard 10 mm. long and broad; all very strongly nerved; longest filaments 6 mm. long, stout, their anthers 6 mm. long, or about 7 mm. if straightened; ovary 1 cm. long, strongly arcuately curved, the style 1.5 mm. long; immature fruit densely tomentose and gray.

Above Cochabamba.

769, "POLYLEPIS VILLOSA," is described as a new species, P. BESSERI, by Hieronymus, Bot. Jahrb. **21**: 312. 1895.

311, "WINDMANNIA ELLIPTICA," is W. SORBIFOLIA H.B.K. Nov. Gen. **6**: 57.

677, "CUPHEA ———," is C. MESOSTEMON Koehne in Mart. Fl. Bras. **13**^{2}: 252.

1005, omitted, is MENTZELIA FENDLERIANA Urb. & Gilg, Mem. Torrey Club **3**: 34.

333, "BEGONIA FAGOPYROIDES" (also *Rusby 686*), is B. SANGUINEA Raddi, Mem. Mod. **18**: 409. 1820.

511, omitted, is probably COUSSAREA TRIFLORA Muell.-Arg. Flora **58**: 467. 1875. Yungas, 1890.

371, "VIBURNUM LASIOPHYLLUM," is V. SEEMENII Graebn. Bot. Jahrb. **37**: 435. 1906.

1841, "VALERIANA MICROPTERINA," is V. POTERIOIDES Graebn. Bot. Jahrb. **37**: 441. 1906.

1428, omitted, is VERNONIA ARISTOSQUAMOSA Britton, Bull. Torrey Club **18**: 332.

1484, "VERNONIA TRIXIOIDES sp. nov.," is included by Hieronymus in V. FULTA Griseb, Symb. 164.

1208, "EUPATORIUM CONYZOIDES," is described as a new species, E. SUBSCANDENS, by Hieronymus, Bot. Jahrb. **22**: 742. 1897.

1444, "EUPATORIUM CONYZOIDES," is referred by the same author to E. CHRISTIEANUM Baker, in Mart. Fl. Bras. **6**^{2}: 298. It is the same as *Rusby 1621*.

913, "ERIGERON BRITTONIANUM sp. nov." Prof. Solms-Laubach has kindly pointed out that this is identical with E. ROSULATUM Wedd. Chlor. And.

1113, "EUPATORIUM VENOSISSIMUM," is OPHRYOSPORUS VENOSISSIMUS (Rusby) Robinson, Proc. Am. Acad. **41**: 271. 1905.

207, "ZINNIA PAUCIFLORA," is Z. MULTIFLORA L. Sp. Pl. ed. 2. 1269, according to B. L. Robinson, who maintains that these are distinct species.

974, "VERBESINA BRIDGESII n. sp." While my name and description were in manuscript, Klatt (Ann. Nat. Hofmus. Wien **9**: 361) published this as V. BOLIVIANA.

1340, "ZEXMENIA sp.?" is

Zexmenia foliosa sp. nov.

Stems lightly, leaves strongly scabrous; stems tall and stout, sharply striate; petioles about 2 cm. long, consisting of the nar-

rowed leaf-bases, broadly dilated at the insertion; blades 1–1.5 dm. long, 4.5–9 cm. broad, somewhat angularly ovate, the subtruncate base abruptly produced into the widely margined petiole, acuminate and acute at the apex, coarsely serrate, membranaceous, dark-green above, pale underneath, 3-nerved, the lateral nerves originating a short distance above the base, the remaining secondaries about 10 pairs, slender; heads several at the summit, the slender, strongly scabrous peduncles about 2 cm. long; outer subfoliaceous bracts of the involucre varying from 1.25–2.5 cm. long, 2–4 mm. broad, linear-lanceolate, tapering regularly from the base to the acute apex, finely nerved; scales of the disk 1.25 cm. long, closely folded, keeled, the acuminate apex lightly recurved; akene 4 mm. long, oblanceolate, strongly flattened and narrowly winged; pappus cupulate, triangularly toothed, the lateral tooth bearing a seta 3–5 mm. long; corolla 1 cm. long, the lower, narrow-cylindrical portion of the tube 3 mm. long, the teeth 1 mm. long, ovate, acutish, the remainder infundibular; anthers black, 4 mm. long, the triangular apical appendages black, acute, sagittate, 0.5 mm. long, the base sagittate; style-branches slightly flattened, 2 mm. long, tipped with linear appendages nearly 1 mm. long.

500, "CENTROPOGON SURINAMENSIS," is described as a new species, C. BANGII, by A. Zahlbruckner, in Bull. Torrey Club **24**: 372. 1897.

738, "CENTROPOGON sp.," and *738a*, "C. SURINAMENSIS," are C. MANDONIS A. Zahlb.

707, "GAULTHERIA CONFERTA," is

Gaultheria barosmoides sp. nov.

Stems creeping, stout, the branches ascending, 15–25 cm. long, brown, densely leafy, loosely clothed with very coarse, spreading, ferruginous, at length deciduous hairs; petioles 1–2 mm. long and almost as broad; blades 6–12 mm. long, 4–8 mm. broad, oval or slightly ovate, the base rounded, the summit blunt or with a small, obtuse point; very thick and rigid, with revolute margin bearing about 6 pairs of short, obtuse teeth, pale-green, black-dotted underneath, the venation on the lower surface prominent, on the upper less so, or impressed when old; principal secondaries mostly 2 pairs, originating below the middle and converging near the summit; bracts broadly ovate, blunt, minutely toothed, brown; pedicels extremely short, stout; flowers about 5 mm. long; calyx three-fourths the length of the corolla, divided nearly to the base, the lobes broadly ovate, acuminate, coriaceous; corolla ovoid-conical, the teeth very small, oval, obtuse; stamens 3 mm. long, the filament broad, dilated at the base, the anther oval, bearing at the summit 4 hair-like awns about half its own length; ovary 2 mm. broad, deeply 5-lobed, the stout style nearly twice its length; fruit 9 mm. long, subglobose, drying black. The same as *no. 1905*.

393, "CLETHRA BRASILIENSIS," I now regard as C. TINIFOLIA Sw. Prodr. Veg. Ind. Occ. 74.

1403 is probably the same as the preceding, and is the same as specimens collected by *Pearce* at Sandillani, 7000–8000 ft., April, 1865. It is not clear as to how great is the variation in length of bracts in the same species, in this genus. Apparently, the character is extremely variable.

717, "CLETHRA BREVIFOLIA," is

Clethra cuneata sp. nov.

Strongly ferruginous-tomentose, the upper leaf-surfaces papillose; much-branched, the branchlets short, ascending, densely leafy, blackish; petioles 5–8 cm. long, very stout, dilated at the insertion; blades 4–7 cm. long, 2.5–4 cm. broad, obovate, cuneate or acute at the base, rounded at the apex, obscurely sinuate-margined, coriaceous, thick, the principal veins impressed above, very prominent underneath, the secondaries 9–12 pairs, connected by the tertiaries, the veinlets finely and strongly reticulate; racemes 5–7 cm. long, numerous in a short-peduncled terminal umbel, mostly simple, the pedicels 3–5 mm. apart, recurved; sepals thick, rigid, 3 mm. long, nearly 2 mm. broad, oval-ovate, obtuse, densely ferruginous, the inner with white, smooth margins; petals 3.5 mm. long, 3 mm. broad, obovate, white, the base thick and brownish, the margin very delicate, the apex subtruncate, or in age emarginate or cleft; filaments 2 mm. long, dilated at the base; anthers nearly 1 mm. long, oval, the thecae much separated at apex and base; ovary densely gray-pilose, 1.5 mm. long, 2 mm. broad; style stout, purple, 1 mm. long, the three stout lobes lightly recurved.

Yungas, 1890. The same as *Mandon 562;* also collected by *Lambert.*

1163, omitted, is

Mayepia implicata sp. nov.

Branchlets numerous, weak, gray, rough-verrucose; petioles 0.5–1 cm. long, stout, strongly channeled above; blades 4–8 cm. long, 1.5–3 cm. broad, lance-oblong, short-acuminate at both ends, obtuse, entire, rigid, glabrous, the midrib impressed above, terete and very prominent underneath, like the 7–8 pairs of slender, crooked secondaries, which connect at some distance from the margin; flowers densely panicled and tangled; calyx divided nearly to the base, the lobes nearly 2 mm. long, oval or obovate, with rounded summit, green, densely gray-pilose; petals 6–8 mm. long, united at the base, or even throughout, in pairs; filaments scarcely any; anther triangular-ovate, obtuse, 0.5 mm. long; pistil about as long as the calyx, lance-ovoid.

Vic. Cochabamba, 1891.

1120 is MANDEVILLA BANGII, as published, but it now appears that Mr. Bang sent a second species under this number. If any of these were distributed, they can be recognized by the following description. They appear identical with specimens collected by *Lorenz* at Tucuman and labeled in Herb. Kew "*Echites funiformis* Griseb." But there is an *Echites funiformis* Vell., which is not Mr. Bang's plant.

Mandevilla subcordata sp. nov.

Glabrous except the finely puberulent petioles and lower leaf-surfaces; branches slender, the internodes elongated; petioles 1.25–3 cm. long, slender; blades 6–8 cm. long, 4–6 cm. wide, oval to ovate, lightly cordate, abruptly short-acuminate and acute, membranaceous, slightly shining above, puberulent underneath, the reddish secondaries 14–16 pairs, the venation finely reticulate, not prominent, translucent; flowering peduncles 5–10 cm. long, few-flowered; pedicels stoutish, 6 mm. long; calyx 8 mm. long, the segments 3 mm. broad, acuminate and acute, thin, when young ciliate at the base; corolla rose-purple, the tube 4 cm. long, infundibular, the anthers about at the middle or a little higher; limb-lobes 3 cm. long and nearly as broad, obovate; anthers 6 mm. long; fruit not seen.

Near snow-line, Mt. Tunari, 1891.

1065, omitted, is MANDEVILLA BANGII.

249, omitted, is (?) DIPLADENIA ILLUSTRIS A. DC. Prodr. **8**: 483. The same form was collected by *Pearce* at Pintobamba, 6000–7000 feet, November, 1863. The form is less tomentose than Brazilian specimens, *Glaziou 17134*.

985, "SARCOSTEMMA INCANUM A. DC.," is

Oxystelma Vailiae sp. nov.

Finely canescent throughout; stems very slender, purplish-green, finely striate; petioles 1–2 cm. long, slender, lightly channeled above, faintly keeled underneath; blades 1–3 cm. long, 0.7–1.5 cm. broad, triangular-ovate or slightly hastate, cordate by a broad shallow sinus, the lobes rounded, acute at the apex, thin, pale-green, the venation slender, inconspicuous, slightly 3-nerved by the stronger basal secondaries; peduncles 1–2 cm. long; umbels 5–10-flowered; pedicels slender, mostly longer at maturity than the peduncles; calyx green, rotate, about 8 mm. broad, divided nearly to the base, the lobes triangular-lanceolate, acuminate and acute; corolla sulphur-yellow with a purple eye, 2 cm. broad, subrotate, shallowly 5-lobed, the lobes triangulate; outer crown purple, closely adnate to the corolla; scales of the inner crown about 2 mm. long, saccate,

strongly laterally compressed, minutely 2-ligulate upon the inner margins.

Vic. Cochabamba, 1891. (*Nos. 985*, type, and *2005*.) The same collected in Bolivia by *Bridges*.

479, "DITASSA LANCEOLATA," is certainly not that species, and is apparently not described, but the inflorescence is too young for a determination. It was first regarded as identical with *Mandon 354* and *Holton 456*, so-called, but these represent still another species, which is undescribed.

1275, "BLEPHARODON MUCRONATUM," is VAILIA MUCRONATA Rusby, Bull. Torrey Club **25**: 542. 1898.

GENTIANACEAE. At the time that the third part of this enumeration was going through the press, Dr. Gilg (Bot. Jahrb. **22**: 301–347. 1896) published a large number of new species of Gentianaceae from Bolivia, and a number of my new species were among them. Being in the country, I did not learn of the publication in time, and a number of synonyms resulted, as follows:

1015, "GENTIANA SPECTABILIS," is G. DIELSIANA Gilg.

1143, "G. MANDONII," is G. INAEQUICALYX Gilg.

1230, "G. VIRGATA," is G. KUSNEZOWII Gilg.

1132, "G. BANGII Rusby," is G. ALBIDO-COERULEA Gilg.

1231, "G. SEMINUDA," is G. GYNOPHORA Gilg.

1232, "G. COCHABAMBENSIS," is perhaps G. KUNTZEI Gilg.

1153, "G. PRIMULIFOLIA Griseb.," is G. BANGII Gilg.

719, "G. PUNICEA Wedd.," is G. DISSITIFOLIA Griseb.

1562, "VOYRIA UNIFLORA," is LEIPHEIMOS APHYLLA (Jacq.) Gilg, in E. & P. Nat. Pfl.

520, "LISIANTHUS CORYMBOSUS," is MACROCARPAEA BANGIANA Gilg.

1697 and (?) *339*, "LISIANTHUS CALYGONUS," are SYMBOLANTHUS BRITTONIANUS Gilg.

1394 and *1443*, "CORDIA SALZMANNI," are perhaps C. LAXIFLORA H.B.K. If not, they are an undescribed species.

313, omitted, is CORDIA GERASACANTHUS L. Syst. ed. 10. 936.

589, "IPOMOEA VARIABILIS," is CALONYCTION ACULEATUM (L.) House, Bull. N. Y. Bot. Gard. **3**: 301.

32, "SOLANUM LYCIOIDES," is S. PSEUDO-LYCIOIDES Rusby, Bull. Torrey Club **26**: 193.

31, "SOLANUM NUDUM," is (?) S. CYMOSUM R. & P. Fl. Per. **2**: 31, *pl. 160*.

740, "SOLANUM MONTANUM," I can now hardly believe pertains to that species, nor have I been able to determine it.

1740, "SOLANUM NUTANS," is

Bassovia phytolaccoides sp. nov.

Inflorescence and lower surfaces of the younger leaves minutely roughish-puberulent; branches herbaceous, weak, coarsely angled; petioles 1–2 cm. long, channeled above and, like the midrib, purple-tinted; blades 1–2 dm. long, 0.5–1 dm. broad, oval-ovate, nearly equilateral, acute at both ends, entire, very thin, deep-green, the venation inconspicuous above, prominent underneath, the 6–8 pairs of secondaries slender, very strongly upcurved; peduncles 1–2 cm. long, slender, the cymes racemiform; pedicels 0.5–1 cm. long, subfiliform; calyx 1.5 mm. long, 3 mm. broad, crateriform, the margin sinuately lobed; corolla 7 mm. long, white or whitish with a deep-blue center, deeply lobed, the lobes ovate, acuminate, costate, anthers 6 mm. long, lanceolate, acuminate, darker at the base; fruit apparently green, globose or slightly depressed, lightly 2-grooved, about 1 cm. in diameter.

Tipuani-Guanai, December, 1892.

1210, "BASSOVIA SOLANACEA," is more likely B. ANCEPS (R. & P.) Rusby.

1182, "NICOTIANA GLAUCA," is N. RUSBYI Britton, Bull. Torrey Club **26**: 166.

157, "CESTRUM PARQUI," is C. MATHEWSII Dun. in DC. Prod. **13**[1]: 637.

631 and *1189*, "CESTRUM STRIGILLATUM," are C. CALYCINUM Willd.; Schlecht. Linnaea **7**: 64. 1832. They are the same as *Rusby 815* and *817*, *Spruce 4154*, *Mathews 1974*, and specimens collected by *Pearce* at Coroico.

401, "FLUCKIGERIA FRITSCHII." Dr. Fritsch finds that the name *Fluckigeria* is preoccupied, and substitutes the name KOHLERIANTHUS FRITSCHII (Rusby) Fritsch, in E. & P. Nat. Pfl. Nachtr.

1510 and *1596*, "BIGNONIA TECOMAEFLORA," I now think must be referred to B. VENUSTA Ker, Bot. Reg. *pl. 249*.

1161, "CRESCENTIA sp." must be referred to C. CUJETA L. Sp. Pl. 626.

1199, "RUELLIA HUMBOLDTIANA," must be written R. WILLDENOVIANA (Nees) Lindau.

1223, "RUELLIA AMOENA," is R. PEDUNCULOSA Nees.

1295, "RUELLIA ———," is R. PROXIMA Lindau, Bull. Herb. Boiss. **3**: 365. 1895.

1354, omitted, is RUELLIA BANGII Rusby, Mem. Torrey Club **6**: 102.

5, "LIPPIA SCORODONOIDES." Some specimens of L. LYCIOIDES Steud. Nom. ed. 2. **2**: 54, may have been distributed with the other.

1223, omitted, is

Salvia erythropoda sp. nov.

Stems shrubby, the branches slender, erect, reddish, strongly quadrangular, sulcate, above pilose, the hairs mostly reflexed, or somewhat tomentose; petioles 5 mm. long, disappearing upward, erect, rigid; blades 2–3.5 cm. long, 4–8 mm. broad, lance-oblong, acutish at the base, acute at the apex, obscurely serrate, rigid, pale-green and canescent both sides, especially underneath; flowers distantly disposed, bractless; pedicels 5 mm. long, stoutish; calyx tomentose, 1.25 cm. long, the tube campanulate, the lips 3 mm. long; corolla 3.5 cm. long, tomentose, scarlet; filament inflated, the anther blackish, 5 mm. long.

1595, omitted, is UVIFERA MEISSNERIANA Britton; Rusby, Bull. Torrey Club **27**: 196.

222, "PEPEROMIA HILARIANA," is P. SYLVATICA C. DC.

330, "PEPEROMIA FRAGRANS," is P. TALINIFOLIA LONGIPETIOLATA C. DC.

331, "PEPEROMIA TRINERVIS," is P. MELANOSTIGMA Miq. Syst. 90.

340, "PIPER BOLIVIANUM," is P. CARACASANUM Bredem.; Link, Jahrb. Gewächsk. 1^3: 61. 1820.

345, "PIPER LECHLERIANUM," is P. GAUDICHAUDIANUM Kunth, Linnaea **13**: 639. 1839.

1640, omitted, is SIPARUNA GUIANENSIS Aubl. Pl. Gui. **2**: 865.

1183, omitted, is SIPARUNA HYPOGLAUCA Perkins, Bot. Jahrb. **31**: 691.

352, omitted, is SIPARUNA SPECTABILIS Perkins, Bot. Jahrb. **31**: 686.

1177, omitted, is (?) ENDLICHERA DYSODANTHA (R. & P.) Mez, Laur. 119.

841, omitted, as well as *1550* and *1552*, but not *1646*, is OCOTEA ALBIDA Mez & Rusby.

1646, distributed and published as part of OCOTEA ALBIDA, is

Ocotea proboscidea sp. nov.

Glabrous; branchlets slender, deep-purple, drying blackish; petioles 6–12 mm. long; blades 5–10 cm. long, 15–30 mm. wide, lanceolate, at the base abruptly contracted and then narrowed

into the petiole, at the summit abruptly contracted and then narrowed into a long, lightly curved, acute acumination, coriaceous, drying pale-green above, brown beneath, the purple midrib and finely reticulate venation slender and prominent on both sides, especially so beneath; panicles solitary in the axils, mostly shorter than the leaves, peduncled, the peduncle, rachis and branches slender; staminate flowers only seen; bud globose, 1.5 mm. in diameter; flower 3–4 mm. broad; calyx-tube crateriform; perianth-segments thin, oval, a little longer than their stamens; filaments of first and second series very short, adnate to the base of the segments, those of the third series erect, with longer filaments, bearing two large, sessile, subglobose glands near the base; fourth series very small, lance-linear, thickish, obtuse; ovary wanting.

Species near *O. corymbosa* (Meissn.) Mez.

232 and *1584*, distributed and published as "EUPHORBIA GENICULATA Ortega," are probably E. HETEROPHYLLA L.

803, "URTICA SUBINCISA," is U. MAGELLANICA Juss.; Poir. Encyc. Suppl. 4: 223. 1833.

127, "URTICA FLABELLATA," is

Urtica Trianae sp. nov.

Pistillate plants only seen. Tall and slender, the stems very pale, sparsely prickly; petioles very slender, 0.5–2 cm. long, the blades 3–6 cm. long, 2–3 cm. broad, ovate, slightly cuneate, acute, thin, bright-green, sparsely prickly on the upper surface, flabellately 5-nerved, the nerves very slender, slightly prominent underneath; margin deeply serrate, the teeth lance-ovate, acuminate, scarcely acute; racemes pubescent, sessile, compound, 0.5–1.5 cm. long and more than half as thick; pedicels 1 mm. long; flowers 2 mm. long; akene 4 mm. long, 2.5 mm. broad, ovoid, turgid, blunt, smooth.

Vic. La. Paz, 1889. The same collected by *Triana* in New Grenada.

1237 and *1658*, "ETHERIUM RACEMOSUM" (misprint for *Ethanium*), should be RENEALMIA MICRANTHA K. Sch.

623, "SISYRINCHIUM IRIDIFOLIUM," is probably S. LEUCANTHUM Colla.

1624, published as "HIPPEASTRUM MANDONII," is

Hippeastrum soratense sp. nov.

Leaves minutely puberulent under a lens, 3–4 dm. long, 2–3 cm. broad, linear or a little broader above the middle, obtuse at the tip, strongly about 30-nerved, the nerves dark; scapes very stout, 2–3 dm. long, 1 cm. or more broad, as pressed; bracts 4–5 cm. long, lanceolate, 1.25–1.5 cm. broad at the base; pedicels about

6 cm. long, strongly curved; ovary about 1 cm. long, 5 mm. broad, oblong; perianth nearly 1 dm. long, the tube about 4 cm. long, 1 cm. broad at the summit, infundibular, the base very slender; stamens and style about equaling the perianth, the anthers 6–7 mm. long; style capitate, lobed, 1 mm. broad.

1379, "DIOSCOREA ———," is D. MULTIFLORA Griseb. in Mart. Fl. Bras. **3**[1]: 35.

1414, "PLATYMISCIUM," is a misprint for PLATYCERIUM.

439, "ANEIMIA TOMENTOSA var.," is A. BREUTELIANA Presl.

1094, "PELLEA MARGINATA," is NOTHOLAENA NIVEA Desv. Jour. Bot. **3**: 93.

135a and *994*, omitted, are THELOSCHISTES CHRYSOPHTHALMUS (L.) Norm.

Enumeration of Numbers Following 1769

RANUNCULACEAE

CLEMATIS GRAHAMI Benth. Pl. Hartw. 5. In fruit, May, 1894. (*No. 2801.*) The same collected by *Pearce* at Muña, 7,000 ft. Nearly *Mandon 866*, but the anthers are not the same.

CLEMATIS FLORIBUNDA Tr. & Pl. Ann. Sci. Nat. IV. **17**: 9. 1862. (*No. 2215.*)

ANEMONE TRITERNATA Vahl. (*No. 1923.*) The same as *1041* and *Rusby 1753*.

RANUNCULUS PSYCHROPHILUS Wedd. Chlor. And. **2**: 300. (*No. 1886.*)

RANUNCULUS PRAEMORSUS H.B.K. in DC. Syst. **1**: 292. (*No. 1916.*) The same as *Mandon 877*.

DILLENIACEAE

DOLIOCARPUS SEMIDENTATUS Garcke, Linnaea **22**: 48. 1849. A scrap without number. The same as *Hostman 707*, from Surinam, in Herb. Kew.

ANONACEAE

Guatteria oblongifolia sp. nov.

Ends of the branchlets and midrib underneath finely ferruginous; branchlets slender, terete, the internodes 2–3 cm. long; petioles 0.5–1 cm. long, stout; blades 1–1.5 dm. long, 4–6 cm. broad, regularly oblong, the base obtuse, the apex abruptly short-acuminate and obtusish, coriaceous, the veins lightly prominent above, more strongly so underneath, finely reticulate, the principal secondaries about 12 pairs; pedicels solitary in the axils, very stout,

thickened upward; perigone and stamens wanting in the specimens, the pistils oblong, about 5 mm. long, inclusive of the short, stout stipe; fruiting pedicels 2.5 cm. long, the stipes about 8 mm. long, the torus depressed-globose, nearly 1 cm. long, the fruits (mature?) oval, reticulate, nearly 1 cm. long. (*No. 2232.*)

Species near *G. oligocarpa.* Near to, if not the same as, *Jenman 4071*, and perhaps the same as *Rusby 1422.*

? TRIGYNAEA MATTHEWSII Benth. Jour. Linn. Soc. 5: 69. 1861. (*No. 1952.*) The specimens lack both flowers and fruit.

MENISPERMACEAE

CISSAMPELOS PAREIRA L. Sp. Pl. 1031. Coroico, Yungas, September 8, 1894. "In dry, gravelly and clayey soil, climbing to the height of ten feet; scarce." (*No. 2422.*)

CISSAMPELOS TROPAEOLIFOLIA DC. Syst. 1: 532. Coripata, Yungas, March 4, 1894. "A climber with yellowish-green flowers, growing in wet, clayey soil; scarce." (*No. 2074.*)

BERBERIDACEAE

BERBERIS DIVARICATA Rusby, Mem. Torrey Club 4: 203. (*No. 1910.*) It is the same as *no. 863*, but in fruit. The fruit (mature?) is 1 cm. long, 7 mm. broad, oval, tipped with a stout, conical style 2 mm. long and large thick stigma 2.5 mm. broad, borne on a stout pedicel, 1.5 to 2 cm. long, slightly thickened upward and subtended by persistent acuminate bracts, 7 mm. in length.

Berberis paucidentata sp. nov.

(Specimens in fruit.) Glabrous; branches elongated, slender, flexuous, terete, dark-brown, leafy; stipules crowded, blackish, rigid, 3 mm. long, broadly ovate, acuminate and acute; leaves 1–2 cm. long, including the narrow petiole-like base, oval-obovate, the apex spinose like the 1–3 pairs of teeth, very thick and rigid, strongly shining above, yellowish underneath, the margin thick, revolute, the venation very coarse and prominent, underneath reticulate; secondaries 4 pairs; fruiting pedicels 5 mm. long, stout, angled, puberulent, their basal bracts similar to the stipules, but smaller; fruit globose, about 8 mm. in diameter, blue, tipped with the globose black stigma, which is about 1 mm. broad. (*No. 1828.*)

Apparently the same as *Mandon 862*, which is in flower, the leaves little larger, the bracts dark-red, the sepals dark-red, 4–5 mm. long, ovate, acutish, rather rigid, the petals somewhat larger, and broader.

PAPAVERACEAE

BOCCONIA INTEGRIFOLIA H.B.K. Nov. Gen. 1: 119. (*No. 2669.*) The same as *Rusby 1161.*

CRUCIFERAE

CARDAMINE OVATA CORYMBOSA Britton. (See *no. 227.*) (*No. 1790.*)

CARDAMINE CHENOPODIFOLIA Pers. Syn. 2: 195. Uchimachi, Coroico, July 17, 1894. "A small plant, with greenish flowers, in cultivated ground." (*No. 2347.*) The same as *Ball's* specimen from Rio Janeiro.

SISYMBRIUM HISPIDULUM (DC.) Tr. & Pl. Ann. Sci. Nat. IV. 17: 63. 1862. (*Turritis hispidula* DC. Syst. 2: 213.) (*No. 1972.*) The same as *Rusby 1208.*

SISYMBRIUM LEPTOCARPUM Hook. & Arn. Bot. Misc. 3: 139. 1833. (*No. 2503.*) The same as *Rusby 1207.*

SISYMBRIUM RUSBYI Britton, Bull. Torrey Club 16: 16. (*No. 1896.*) The same as *Rusby 1432.*

Matthewsia diffusa sp. nov.

Younger portions minutely puberulent and apparently glandular; stems at length 2 dm. or more long, prostrate, coarsely angled, sub-fleshy, much branched, leafy; petioles short and broad, clasping; leaves about 3 cm. long, 1.5 cm. broad, bipinnate, the pinnae about 10 pairs, their pinnules or segments 2 or 3 pairs, oblong, obtuse, entire, fleshy; pedicels 2–3 mm. long, stout, strongly angled; sepals persistent, 3 mm. long, ovate, obtuse, very slightly exceeded by the very thin white petals; capsules about 1 cm. long, exclusive of the stout, persistent style, which is 2 mm. long, lanceolate, falcate, tuberculate by the contained seeds, which are oval-orbicular, flattened, greenish, 1 mm. long. (*No. 1967.*)

LEPIDIUM AFFINE Wedd. Ann. Sci. Nat. V. 1: 284. 1864. (*No. 2802.* This number and "*2402*" may have been transposed for this and a fern.) The same as *Mandon 927.*

CAPPARIDACEAE

CLEOME GLANDULOSA R. & P.; DC. Prodr. 1: 238. Without number. The same as *Rusby 734.*

VIOLACEAE

VIOLA PYGMAEA Juss.; Poir. Encyc. 8: 630. (*No. 1872.*)

BIXINEAE

COCHLOSPERMUM HIBISCIOIDES Kunth, Syn. Pl. Aeq. 3: 214. (*No. 1978.*)

Xylosma ovata sp. nov.

(Specimens in fruit.) Younger portions of the branchlets and the veins underneath blackish-glandular, hairy, otherwise glabrous; branchlets stout, flexuous; petioles 5 mm. long, very stout; blades 7–15 cm. long, 4–6 cm. broad, ovate, the base rounded, the apex abruptly short-acuminate and obtuse, distantly and sub-obsoletely serrate, thickish, rigid; midrib and secondaries prominent underneath, the latter about 10 pairs; axillary fascicles about 5–7-fruited, the blackish bractlets 3–4 mm. long, subulate, thick and rigid, the pedicels filiform, 2.5–4 cm. long; fruit broadly ovoid, nearly 1 cm. long, the style very short and much broader, the stigmas 4, two-lobed, peltate, thick, nearly 1 mm. broad (in fruit); seed angularly ovoid, smooth, 4 mm. long. (*No. 2382.*)

"A shrub, about 6 ft. high, in wet, shaded forest-mould." Sacramento, Yungas, August 14, 1894.

POLYGALACEAE

POLYGALA SPECTABILIS (DC. Prodr. 1: 331) var. **minor** Chodat, var. nov.

Flowers one-third smaller than in the type. (*No. 2803* or *2403.*)

POLYGALA ANGUSTIFOLIA H.B.K. Nov. Gen. 5: 405, *pl. 511* (non Bennett). "Abundant in coca plantations and other cultivated grounds." Coripata, Yungas, March 20, 1894. Flowers white. (*No. 2096.*)

POLYGALA FORMOSA A. W. Bennett, Bull. Torrey Club 16: 19. (*No. 2674.*) The same as *Rusby 1908.*

BREDEMEYERA FLORIBUNDA Willd. Ges. Naturf. Freunde Neue Schr. 3: 412. 1801. Coripata, Yungas, April 23, 1894. (*No. 2143.*) "A shrub, 15–20 feet high, rather thin and climbing, with greenish-yellow flowers. Rather scarce, in good rich mould, river bank." The same as *Pearce's* specimens from Chairo, 4,000–5,000 ft., April, 1866.

MONNINA BOLIVIENSIS A. W. Bennett, Bull. Torrey Club 16: 20. (*No. 1970.*) The same as *Rusby 1970.*

MONNINA PARVIFLORA H.B.K. Nov. Gen. 5: 419. "Shrub about 6 feet high, with blue flowers, growing in clayey forest

mould." Coroico, September, 1894. (*Nos. 2445* and *2673*.) The same as *no. 292* and *Rusby 1909* and *1913*.

MONNINA STIPULATA Chodat, Bull. Herb. Boiss. 1: 354. (*No. 2805*.) This number and "*2405*" may have been transposed for this and an *Allophylus*.

MONNINA SALICIFOLIA R. & P. Syst. Veg. 172. (*No. 2804*.) Perhaps distributed as "*2404*," which is Apocynaceous; a *Justicia* was also distributed as "*2404*."

Monnina nigrescens sp. nov.

Shrubby, the branches erect, slender, elongated, channeled, tomentose, the internodes about 3–5 cm. long; leaves inserted by a narrow petiole-like base, 5–8 cm. long, 2–3 cm. broad, oblong or somewhat obovate, irregular, acute, entire, softly pubescent, especially underneath, thin and flaccid, drying blackish-green; veins coarse, not prominent, the secondaries about 6–8 pairs; racemes at length long-peduncled by thefalling of the lower flowers, finally 1 dm. in length, at first dense, nearly 1 cm. broad; bracts about 3 mm. long, alternate; pedicels one fourth the length of the flowers, which are 3–4 mm. long; lateral outer sepals 1.5 mm. long, 1 mm. broad, oval, obtuse, the margin thin, white-fimbriate, the lower 2.5 mm. long; wings green, orbicular, strongly concave, 3.5 mm. broad, entire, strongly purplish-veined (about 3 pairs); keel green, nearly hemispherical, cleft about two fifths of the way, a blunt lobe about 0.5 mm. long on each side at about the middle; filaments about 1.5 mm. long, united to the middle, the anthers about 0.75 mm. long, ovate, obtuse, incurved; upper petals nearly equaling the filaments, white, puberulent at base, falcately oblong-ovate, the apex rounded; ovary about 0.75 mm. long, green, the style rather longer, its dilation commencing abruptly about one third of the way from the base and increasing to near the 2-lobed gray stigma; capsule nearly orbicular, 4 mm. broad, cordate with the lobes acute, brown with a green, strongly reticulate margin, the apex lightly emarginate. (*No. 2835* or *2435*.)

VOCHYSIACEAE

Trigonia echiteifolia sp. nov.

Younger portions, under sides of leaves, and inflorescence, including calyx, densely short-tomentose, slightly ferruginous; upper leaf surfaces minutely stellate, shining; branches elongated, slender, terete, deep red-purple, the internodes mostly 5–6 cm. long; stipules 8 mm. long, 2 mm. broad, linear, acuminate and acute; petioles 5–8 mm. long, rather slender; blades 5–8 cm. long, 2–5 cm. broad, inequilaterally ovate to obovate, slightly cordate, abruptly short-acuminate and acute, above bright-green, shining, the veins lightly impressed, underneath yellowish-white, the veins prominent, the

secondaries about 10 pairs, connected by the tertiaries; panicles axillary and terminal, loosely branched at the base, the dense branches 3–8 cm. long, 1.5–2 cm. broad, mostly floriferous to the base, the branchlets mostly 3–flowered, the bracts lance-linear, weak, mostly 3–4 mm. long, acute; largest sepal 6 mm. long, 2.5 mm. broad, ovate, obtuse, unguiculate, the exterior equal, 2 mm. broad, strongly unguiculate, the base sub-auriculate on one side, the interior 5 mm. long, 2 mm. broad, ovate, acute; larger petal 5 mm. long, the apex rounded and recurved, purple above, paler and pale-bearded below; lateral petals 5 mm. long, 1.5 mm. broad, inequilaterally oblanceolate with rounded apex, the claw white-bearded; inner petals 3 mm. long, very irregular, subsulcate; stamens 3 mm. long, the anthers 1 mm. long; pistil 3 mm. long, the ovary and base of style densely long white-pilose; glands very small. (*No. 2812* or *2412.*) Species near *T. villosa.*

Trigonia floccosa sp. nov.

Branchlets elongated, slender, purplish, the younger portions white-floccose, the internodes mostly about 3–5 cm. long; stipules erect, 1 cm. long, lance-linear, attenuate and acute, canescent, deciduous; petioles 0.5–1 cm. long, stout, mostly recurved; blades 4–8 cm. long, 2–5 cm. broad, ovate to obovate, mostly inequilateral, rounded to sub-cordate at base, short-acuminate and very acute at the apex, entire, above dark-green, white-floccose, rugose with strongly impressed veins, underneath tomentellate and ferruginous, the venation prominent, reticulate, the secondaries about 8 pairs; inflorescence, including the outer surface of the calyx, densely short gray-tomentose; panicles 4–8 cm. long, 1–2 cm. broad, dense, except at the base, their branchlets mostly 2- or 3-flowered; bracts 5–8 mm. long, lance-ovate, attenuate and acute; pedicels very short, slender; anterior sepal 6 mm. long, 5 mm. broad, ovate, obtusish, strongly concave, sessile by a broad base, the exterior of about the same length, 3 mm. broad, slightly inequilateral, the inner 7 mm. long, 3 mm. broad, highly inequilateral and slightly falcate, blunt-pointed, paler; large petal 6 mm. long, pale above, yellowish with intruded folds at the middle, the broad sac purple and densely purple-bearded within, the apex rounded or lightly emarginate; anterior petals 5 mm. long, 1.5 mm. broad, oblanceolate or spatulate, the apex rounded, inequilateral and slightly falcate, the base bearded; the lateral very irregular, 4 mm. long, subsaccate, not bearded; stamens 3 mm. long, the larger anthers 1 mm. long; glands 4, united in pairs, red-purple, 1 mm. long, irregularly quadrangular, oval or orbicular; perfect stamens 5 or 6, unequal; pistil as long as the stamens, the ovary and base of the stout style densely long white-pilose.

"A climber with yellowish-white flowers. One plant found, in wet clay, at Coripata, May 14, 1894." (*No. 2191.*)

Very near the last, but differing in the floccose and more rugose upper leaf-surfaces and young shoots, the unbranched panicles, larger flowers, coloration, more open sac and intruded folds of the large petal, and in the large, conspicuous glands.

CARYOPHYLLACEAE

SILENE GALLICA L. Sp. Pl. 417. (*Nos. 1945* and *3001.*) The same as *Rusby 2476.*

LYCHNIS ANDICOLA (Gill.) Britton, Bull. Torrey Club **16**: 61. (*No. 1863.*) The same as *Rusby 1179* and *Mandon 989.*

? CERASTIUM VULGATUM L. Fl. Suec. **2**: 158. Specimen without number. The same form collected several times by *Ball;* also collected by *Gustav Bernoulli* in Guatemala (*no. 191*).

ALSINE NEMORUM (L.) Schreb. Spicil. 30. (*No. 1840*, and Coroico, September, 1894, *no. 2443.*) "Half climbing to 3 feet, in wet mould, in shade; flowers white." The same as *Rusby 1184.*

ARENARIA ALSINOIDES (Michx.) Rohrb. in Mart. Fl. Bras. **14**[2]: 274. (*No. 2053.*) The same as *Rusby 1187*, *1188* and *1189.*

PORTULACACEAE

CALANDRINIA ACAULIS H.B.K. Nov. Gen. **6**: 78. (*No. 1903.*) Same as *917.*

CALANDRINIA CAULESCENS H.B.K. Nov. Gen. **6**: 78, *pl. 526.* (*No. 1948.*) The same as *Mandon 1000* and *Rusby 2601.*

HYPERICACEAE

Hypericum stylosum sp. nov.

Glabrous, perennial, the root stout, branched or simple; stems 3–6 dm. high, solitary, erect from an ascending base, reddish-brown, the internodes 3–5 cm. long; branched from near the base, the branches elongated, slender, ascending at an angle of about 45°; leaves sessile, 1.5–2.5 cm. long, 4–8 mm. broad, oblong, the apex obtuse to rounded, obscurely 3–5-nerved, pale underneath, very thin; cymes elongated, loose except at the summit, the bracts linear, about 5 mm. long; pedicels 3–5 mm. long, sharply angled; sepals 5 mm. long, lanceolate, acuminate and acute, 1-nerved; petals oval, slightly exceeding the sepals; styles 5, distinct, stout, 3 mm. long, distinctly exceeding the stamens; capsule ovoid, 5 mm. long, 3 mm. broad.

"A small plant, from 10 inches upward, in height, the flowers yellow, in running water." Coripata, March 30, 1894. (*No. 2107.*)

CAOPIA CRASSA Rusby, Mem. Torrey Club 4: 204. (*No. 2931.*) This is apparently the same as *Parker's* Demerara specimen, called "*C. guianensis.*"

CAOPIA GLABRA (R. & P.) Kuntze, Rev. Gen. 59. (*No. 2933.*)

GUTTIFERAE

CLUSIA MULTIFLORA H.B.K. Nov. Gen. 5: 200. (*No. 1975.*)

CLUSIA RAMOSA Rusby, Mem. Torrey Club 4: 204. (*No. 2371.*)

CLUSIA sp. (*No. 2411.*)

SYMPHONIA GLOBULIFERA L. f. Suppl. 302. (*No. 1954.*) The same as *Rusby 1853.*

TERNSTROEMIACEAE

RUYSCHIA GUIANENSIS (Aubl.) Vitm. Summa Pl. 2: 250. 1789. (*Souroubea guianensis* Aubl. Pl. Gui. 1: 244. 1775. = *Ruyschia Souroubea* Sw. Prodr. Veg. Ind. Occ. 50. 1788.) "In rich mould, forest shade, climbing to a height of 15 or 20 feet; scarce; flowers green." Coroico, Yungas, 5,500 ft., September 1, 1894. (*No. 2401.*) The same as *Hayes 345.*

? TERNSTROEMIA BRASILIENSIS Camb. in A. St. Hil. Fl. Bras. Mer. 1: 298. *pl. 59.* "Shrub about 8 ft. high, in rich forest mould, scarce." Near Coroico, Yungas, July 24, 1894. (*No. 2360.*) Also collected by *Pearce* at Santa Cruz, 7,000 ft., December, 1864. The leaves are larger and heavier, the calyx is lighter and the pod thinner than in *T. brasiliensis.*

Ternstroemia asymmetrica sp. nov.

Glabrous; branchlets short, stout but weak, widely spreading or recurved, gray, rough, very leafy toward the summit; leaves 5–8 cm. long, 2–3 cm. broad, oblanceolate to obovate and inequilateral, the apex slightly and bluntly acuminate, the base tapering into a very short, stout, purple, margined petiole, thick, the margin entire, thinly revolute; midrib sharply impressed above, very prominent, terete and purple underneath; venation imperceptible underneath, very perceptible above, the secondaries about 10 pairs; pedicels about 1 cm. long, stout, purple; sepals rotund-elliptical, 5 mm. long, thick, purple-brown, the petals scarcely longer, but broader; style scarcely any. (*No. 1974.*)

The same as *no. 837,* but not *838.* Differs from *T. brasiliensis* in the inequilateral leaves, and the smaller flowers, with calyx of lighter texture. *Spruce 4398* is in part the same.

MALVACEAE

MALVASTRUM CAPITATUM (Cav.) Griseb. Goett. Abhand. **19**: 90. 1874. (*Malva capitata* Cav. Diss. **5**: 28. *pl. 137, f. 1.*) (*Nos. 1897* and *2052.*)

MALVASTRUM RUSBYI Britton, Bull. Torrey Club **16**: 64. (*No. 2806* or *2406.*)

MALVASTRUM TRICUSPIDATUM (R. Br.) A. Gray, Pl. Wright. **1**: 16. (*Malva tricuspidata* R. Br. in Ait. Hort. Kew. ed. 2. **4**: 210.) "Plant 1–2 ft. high, with yellow flowers." Coripata, Yungas, March 28, 1894. (*No. 2111.*)

MALVASTRUM PEDICULARIFOLIUM (Meyen) A. Gray, Bot. U. S. Expl. Exp. **1**: 152. (*Sida pedicularifolia* Meyen, Reise **1**: 460.) (*No. 1964.*)

ANODA TRIANGULARIS DC. Prodr. **1**: 459. "Plant 3–5 ft. high, common in coca plantations." Coripata, Yungas, March 4, 1894. (*No. 2073.*)

? GAYA GAUDICHAUDIANA A. St. Hil. Fl. Bras. Mer. **1**: 192. (*No. 2221.*)

SIDA RUFESCENS A. St. Hil. Fl. Bras. Mer. **1**: 185. (*No. 2807* or *2407.*) The same as *Rusby 1454*, published as *S. urens* L.

SIDA CORDIFOLIA L. Sp. Pl. 961. (*No. 2211.*) The same as *Rusby 1456* and *1457.*

WISSADULA PERIPLOCIFOLIA (L.) Presl, Rel. Haenk. **2**: 117, in obs. (*Sida periplocifolia* L. Sp. Pl. 684.) (*No. 2809* or *2409.*)

WISSADULA HIRSUTA Presl, Rel. Haenk. **2**: 118. (*No. 2808.*) The same as *Rusby 1861.*

Wissadula grandifolia Baker fil. sp. nov.

Allied to *W. hernandioides* Garcke and *W. Gymnanthemum* K. Sch. Stem erect, together with petioles and peduncles covered with a close dense rufescent or fuscous tomentum; leaves ovate-lanceolate, very acuminate, base distinctly cordate, palmately 7–9-nerved, margin entire, covered on both sides with a soft close tomentum, under side lighter-colored; larger leaves on specimen about 20 cm. long, 10.5 cm. broad, the smaller 8–12 cm. long, 3.5–8.5 cm. broad; petiole of larger leaves 10–11 cm. long; panicle leafy; pedicels not so long as in *W. hernandioides;* fruiting pedicels about 1.5 cm. long; sepals ovate or triangular, acute, pubescent externally; petals oblanceolate or narrowly obovate (when dried yellow), 8–9 mm. long; carpels 3–4, pointed, 7–8 mm. long, those examined 2-seeded; seeds about 2 mm. long.

This plant has ovate-lanceolate, long-acuminate leaves which are

about twice as long as broad. The pedicels are shorter than those of *W. hernandioides* Garcke. It is quite different from *W. decora* recently described by Mr. Spencer Moore (Trans. Linn. Soc. II. **4**: 312) from Puerto Pachico; but may be identical with *W. gymnanthemum* K. Sch., a plant which I only know from description, but the petioles here are more than double the length given by Dr. Schumann (Fl. Bras. **12**^{3}: 446). The lamina of the leaf also appears to be very much larger.

"In damp soil along roads. About 6 ft. high, with yellow flowers." Coroico, Yungas, August 2, 1894. (*No. 2366.*)

Abutilon crispum (L.) Medic. Malv. 29. (*Sida crispa* L. Sp. Pl. 685.) "About 5 ft. high, with yellow flowers, in wet, clayey soil. But one plant seen." Coripata, Yungas, April 27, 1894. (*No. 2167.*)

Abutilon benense (Britton) Baker fil. Jour. Bot. **31**: 338. 1893. (*Sida benensis* Britton, Bull. Torrey Club **16**: 153.) (*No. 2621.*) The same as *Rusby 1455.*

Abutilon mollissimum (Cav.) Sweet, Hort. Brit. ed. 2. 53. (*Sida mollissima* Cav. Diss. **2**: 49. *pl. 14, f. 1.*) (*No. 1980.*) The same as *Mandon 824.*

Abutilon Bakeri sp. nov.

Branches erect, rather slender, terete, bright-green, finely stellate-hairy, and the younger portions sparsely pilose; stipules broadly ovate, acuminate and acute, nearly 1 cm. long, foliaceous; petioles 4–5 cm. long, stellate and pilose, stoutish; blades 4–12 cm. long, 3–8 cm. wide, 3-lobed, the larger slightly, the smaller strongly, cordate with a closed or narrow sinus, acuminate and acute, both at the apex and at the lobes, when the latter are well developed, irregularly and unequally dentate with short, broad, blunt teeth; thin, deep-green; primaries 5–7, the lower one or two pairs declined, prominent on both surfaces, connected by the secondaries and these by the tertiaries; upper surface scabrous, the hairs slightly stellate, the lower velvety; flowers about 5, semi-corymbose at the summits of the branches, the pedicels 5–7 cm. long, slender, stellate and pilose like the calyx, which is 2.5 cm. long, divided three-fourths of the way, the lobes ovate, long-acuminate and acute; corolla 3–4 cm. long, yellow, strongly and coarsely veined; stamens slightly exserted, a little shorter than the 10 styles, the stigmas large; fruit 2 cm. long, 2.5 cm. broad, blackish, pilose, strongly beaked.

Allied to *A. sylvaticum* K. Schum. and *A. macrophyllum* St. Hil. & Naud.

"Six to 10 ft. high, abundant in wet soil, the flowers yellow." Near Coroico, July 22, 1894. (*No. 2357.*)

SPHAERALCEA MANDONI Baker fil. Jour. Bot. **31**: 364. 1893. (*No. 1927.*) The same as *Mandon 808.*

PAVONIA COMMUNIS A. St. Hil. Fl. Bras. Mer. **1**: 224. "A yellow-flowered shrub, 8–10 ft. high, common in dry gravelly slate." Coripata, Yungas, February 28, 1892. (*Nos. 2067* and *1979.*)

Bombax (*Pachiropsis*) **Rusbyi** Baker fil. sp. nov.

Probably a tree; young branches almost glabrous. Leaflets 3–7, ovate or oblong-ovate, coriaceous, base subcordate, apex obtuse or subobtuse, more rarely subacute, penninerved, generally with 8–10 lateral nerves, glabrous on both sides, distinctly petiolulate, lamina 6–16 cm. long, 6.5–9.5 cm. broad, petiolule 1.5–2 cm. long, petiole 11–13 cm. long, apex expanded into a disk; peduncle thick, about 3 cm. long; calyx cupuliform, subentire with about 10 glands at the base; petals strap-shaped, externally olive-colored or ferruginous-tomentellous, 10–12 cm. long; staminal column glabrous, 2–2.5 cm. long; free filaments 4–6 cm. long; anthers hippocrepiform, at least in the dried state; capsule about 15 cm. long; seeds immersed in light-brown wool.

Yungas, 6,000 ft., 1885. First collected by *Dr. H. H. Rusby* (*no. 1928*). *Bang* (*no. 2282a*). This is the plant referred to in Bull. Torrey Club. **16**: 154 (1889) as "*Bombax* ?." It is allied to *Bombax longiflorum* K. Schum. and *B. cyathophorum* K. Schum., the staminal tube being glabrous and the leaflets also glabrous. I have much pleasure in dedicating this species to the discoverer, Dr. H. H. Rusby.

[Mr. Bang's specimens of this number were accompanied by the following note: "More flowers and fruits to be sent next. The leaves all dropped off now, and buds already coming out." This note doubtless refers to the coriaceous leaves, which fall just as the next year's growth commences. The specimens were followed, according to promise, by others, but the latter were evidently taken from a different tree and present marked differences. They agree with *Rusby 1928*, the mature leaflets being 6–11 cm. long by 6–8 cm. broad, the most of them rotund-ovate. The pedicels are about 3 cm. long, the calyx 1.75 cm. long by 2.25 cm. broad (as pressed). Stamen-column 3–3.5 cm. long; free portions of stamens 7–8 cm. long. The original *2282* showed the following proportions: leaflets 12–18 cm. long, 8–10 cm. broad and less strongly cordate; pedicels 2.75–3 cm. long, calyx 2–2.5 cm. long by 2 cm. broad (as pressed); stamen-column 3.5 cm. long, free portions of stamens 1 dm. long. The form of leaves and calyx-tube and relation of stamens (free portion) to tube are so markedly different that I am inclined to think they represent two species. I, therefore, call the first and larger-leaved collection *2282*, the second *2282a*. H. H. R.]

? Ceiba Mandoni Britten & Baker fil. Jour. Bot. 34: 175. 1896. This has but five leaflets. (*No. 1949.*)

STERCULIACEAE

Helicteres amplifolia sp. nov.

Shortly stellate-tomentellate and ferruginous; branches elongated, stoutish, flexuous, angled, the internodes mostly about 4–7 cm. long; stipules 0.75–1 cm. long, abruptly linear from a broad base; petioles 2–4 cm. long, stout, sub-terete; blades 1–1.5 dm. long, 0.75–1.25 dm. broad, ovate, strongly cordate, abruptly short-pointed and mostly obtuse, doubly serrate with short, broad teeth, thin, deep-green and sparsely stellate above, gray underneath with the rather coarse venation somewhat prominent, the principal secondaries about 5 pairs, with one or two smaller basal pairs; pedicels very short and stout; calyx-tube 1 cm. long, 8 mm. broad (as pressed), campanulate with the mouth slightly contracted, the lobes 1 cm. long, oval, the base slightly narrower, acutish, 1-nerved; petals deep-red, exceeding the calyx by about 5 mm., the limb oval, obtuse; stamen-column exserted nearly 7 cm.; anthers 10, 3–4 mm. long; style 6–7 mm. long; fruit not seen. (*No. 2648.*) Species near *H. barnensis.*

Melochia polystachya (H.B.K.) Tr. & Pl. Ann. Sci. Nat. IV. 17: 341. 1862. (*Mougeotia polystachya* H.B.K. Nov. Gen. 5: 328.) (*No. 2810* or *2410.*) The same collected by *Pearce* at Coroico, 3,000–4,000 ft., December, 1865. *Burchell* "*6693–2*" may be the same.

? Melochia nodiflora Sw. Prodr. Veg. Ind. Occ. 97. "4–6 ft. high, with light-red flowers, in wet cultivated ground." Coripata, Yungas, April 16, 1894. (*No. 2132.*)

Melochia yungasensis sp. nov.

Pubescence minute; root vertical, stout, woody, little-branched; stems numerous, erect or ascending from a branched crown, slender, 3–5 dm. long, nearly simple, the internodes about 2 cm. long, angled, reddish-brown; stipules 2–3 mm. long, lance-ovate, acute; petioles 1–1.5 cm. long, slender; blades 2.5–4 cm. long, 2–3 cm. broad, ovate, somewhat inequilateral, cordate, acuminate and acute, coarsely and irregularly serrate, thin, bright-green above, pale and the venation prominent underneath, the secondaries about six pairs, at an angle of about 45°, reddish; flowers few, on slender pedicels shorter than themselves; calyx 4 mm. long, divided two-thirds to the base, the lobes ovate, acuminate, acute; corolla 6 mm. long, the petals very short-clawed; filaments lightly coherent to near the summit, broad, membranaceous, shining, brown, a little more than 1 mm. long; anthers 1 mm. long, broadly ovate, usually flattened;

ovary sub-globular, 5-lobed, pilose, 2 mm. long; styles 5, distinct, a little more than 1 mm. long, slender, the summits recurved; stigma small.

Yungas. (*No. 1977.*)

Guazuma coriacea sp. nov.

Branchlets slender, ascending, terete, dark purple-brown, puberulent at the apex; petioles about 1 cm. long, stout; blades 5–8 cm. long, 2–4 cm. broad, narrowly ovate, the base lightly cordate, the apex long-acuminate and acute, the margin finely crenate-serrate, thickish and rigid, above glabrous, underneath puberulent, especially on the veins; venation slightly prominent above, more so underneath, the secondaries about six pairs, connecting near the margin, the veins reticulate; pedicels (the fruiting only seen) stout, 1–1.5 cm. long; fruit spherical, or when mature very slightly depressed, nearly 1.5 cm. in diameter at maturity, blackish-brown, very strongly tuberculate, the tubercles about 2 mm. broad, the basal about half as large, strongly wrinkled, bluntly short-beaked; seeds glabrous, brown, 1–2 cm. long, angular. (*No. 2217.*) Near *Rusby 1859.*

? Ayenia tomentosa L. Syst. ed. 10. 1247. "Rather scarce on dry, clayey hillsides. Flowers dark-brown." Coripata, Yungas, March 28, 1894. (*No. 2115.*) I believe that a number of distinct species will be found included under this name, and this may hereafter be separated therefrom.

Chaetaea hirsuta (R. & P.) Rusby, Mem. Torrey Club 3^3: 10. (*No. 2205.*)

? Thomasia sp. "Rather scarce in dry, clayey, grassy soil. Flowers light red-rose." Coripata, Yungas, April 27, 1894. (*No. 2164.*) The specimens as they reach me are without flowers and fruit, and even a generic determination is not possible.

TILIACEAE

Heliocarpus popayanensis H.B.K. Nov. Gen. 5: 341. "A tree 20–25 ft. high and not very stout, with yellow flowers, growing in wet mould and clay. The bark is very strong and is used for binding together the frame-work of houses. Abundant." Calapampa, near Coroico, July 2, 1894. (*No. 2305.*)

Luehea tomentella sp. nov.

Branchlets short, stout, flexuous, blackish, terete, the younger portions thinly, the under leaf-surfaces, petioles, and inflorescence, including both surfaces of the involucre and outer surface of sepals,

densely ferruginous-tomentose; stipules caducous, nearly 1 cm. long, ovate, obtuse, concave, rigid and thick, bluntly carinate; petioles 0.5–1 cm. long, very stout; blades 7–10 cm. long, 3–6 cm. broad, ovate, inequilateral, rounded at the base, acute or acutish at the apex, serrate with small acute teeth, strongly 3-ribbed, the other secondaries 4 on one side, 3 on the other, connected by the tertiaries; thick and rigid, minutely scabrous and the venation obscure above, the latter prominent underneath; panicles terminal, broad (2 dm.), the branchlets and pedicels erect; bracts caducous, 1.5 cm. long, oval or obovate; pedicels at length 1–1.5 or even 2 cm. long, twice as stout as their branchlets, strongly bluntly quadrangular; buds globose-ovoid, 1 cm. or more long, strongly bluntly 10-costate; involucral bracts 9, 2–2.5 cm. long, 5–6 mm. broad, lanceolate, narrowed at the base, acute, thick, valvate-reduplicate and internally carinate in the bud; sepals 5, valvate, 3–3.5 cm. long, 1.5 cm. broad, ovate, obtusish, strongly 3-nerved, within purple and nearly glabrous; petals 5, 4 cm. long, very broadly obovate, shortly and stoutly unguiculate, purple, darker and pubescent at the base, strongly veined; stamens to 2 cm. long, white-pilose, in 5 phalanges, each phalange bearing externally, at its base, a scale 1 cm. long, 5 mm. broad at the base, divided two-thirds of the way into filiform pilose divisions similar to the filaments; anthers reniform or semicircular, nearly 2 mm. long from base to base; ovary oblong, 8 mm. long, pilose; style 8 mm. long, 2–3 mm. thick, slightly larger and strongly angled above, pilose at the base; stigma 5 mm. broad, thick and fleshy, strongly umbilicate at the base, 5-lobed, the lobes irregularly crumpled and toothed; fruit unknown.

"A stout tree 40 ft. high, with white flowers, abundant in gravel and clay." Coripata, Yungas, June 24, 1894. (*No. 2295.*) Probably identical with *Burchell 4778.*

MALPIGHIACEAE

Bunchosia pilocarpa sp. nov.

Branches stout, terete, glabrous, dilated at the nodes; leaves glabrous, the petioles about 1 cm. long, stout, margined, the blades 1–2 dm. long, 4–8 cm. broad, oval to obovate, the base blunt, the apex abruptly very short-acuminate, obtuse, coriaceous but rather thin, glabrous, rather pale, venation slender, lightly prominent underneath, reticulate, the midrib lightly impressed above, principal secondaries about 10 pairs; racemes (the fruiting only seen) solitary in the axils, simple, 8–15 cm. long, strongly peduncled, loose, the pedicels stout, 0.5–1 cm. long, articulated and strongly glandular-tuberculate a little below the middle; calyx 7 mm. broad, broadly cup-shaped, the glands large, obovate, of the same color as the calyx, recurved-spreading at the apex; fruit light-gray, densely

short-tomentose, globular, or slightly narrowed above, strongly 2-grooved, the apex short-truncate, tipped with the stout style. (*No. 2249.*)

Heteropteris ovalifolia sp. nov.

Glabrous, except the finely ferruginous inflorescence; branches stout, terete, purplish; petioles 5 mm. long, very stout, the base dilated, blackish-brown; blades 5–8 cm. long, 4–5 cm. broad, oval-elliptical, coriaceous, thick, coarsely reticulate, the terete veins prominent below; panicles strongly peduncled, ample, pyramidal, open, the floral leaves very small, recurved, ferruginous like the rest of the inflorescence; flowers crowded on the short branchlets, the pedicels stout, 2–5 mm. long; calyx sub-hemispherical, 4 mm. broad, the sepals blunt or rounded at the apex, the glands black, nearly 2 mm. long, broadly elliptical; limb of the petals very broadly elliptical, 3 mm. long, the claw slender, 2 mm. long; stamens nearly equaling the style, exceeding the calyx by 1–2 mm., the anthers large and broad; fruit 2.5 cm. long, the seminiferous portion about 4 mm. long and broad, strongly concave at the base, unappendaged, strongly nerved, pubescent, the wing 1 cm. broad a little above the middle, 7 mm. broad at the narrowest portion, which is about 4 mm. above the base, strongly nerved.

"A low climber with yellow flowers, in gravel and clay." Coroico, September, 1894. (*No. 2458.*)

Stigmaphyllon tomentosum A. Juss. in A. St. Hil. Fl. Bras. Mer. **3**: 53. (*No. 2296.*)

Banisteria argentea (H.B.K.) Spreng.; A. Juss. Arch. Mus. Par. **3**: 393. 1843. (*Heteropteris argentea* H.B.K. Nov. Gen. **5**: 164.) (*No. 2061.*)

? Banisteria oxyclada A. Juss. Arch. Mus. Par. **3**: 396. 1843. (*No. 2813.*)

Banisteria Spruceana Griseb. in Mart. Flor. Bras. **12**[1]: 45. "A climber on the ground, with yellow flowers, in dry, gravelly and clayey soil." Coroico, September, 1894. (*No. 2457.*) The same as *Rusby 515.*

Banisteria Pearcei sp. nov.

Glabrous, except the inflorescence; branchlets gray, densely leafy; petioles 3 mm. long, stout, margined, brown; blades 4–8 cm. long, 1.25–2.5 cm. broad, lance-oblong, the base acute to acuminate, the summit abruptly acuminate, acute; coriaceous, gray-green, lustrous, venation slender and lightly prominent both sides, reticulate, the secondaries about 9, strongly ascending, connecting close to the margin; inflorescence sparse, lightly ferruginous; peduncles a little exceeding the petioles, the few seen about 5-

flowered; mature buds nearly globular, 4 mm. long, the nearly circular calyx-lobes almost half its length, the broadly oval glands about half the length of the calyx; petals (apparently yellow), including the slender claw, about 6 mm. long, 5 mm. wide, lacerate; fruiting pedicels slender, terete, 1.5 cm. long; fruit 15–22 mm. long, 6–9 mm. wide; base of wing 3–4 mm. broad, the broadest portion about two thirds of the way from base to summit; glands broadly oval, about 1.5 mm. long. (*No. 2811.*)

The same collected by *Pearce* at Chailla, 4,000 to 5,000 ft., May, 1866, and deposited in Herb. Kew under the name *B. Spruceana.*

Banisteria sanguinea sp. nov.

Branches stoutish, terete, red-purple, the younger portions, like the peduncles, pedicels and lower leaf-surfaces ferruginous-tomentose; petioles 0.5–1 cm. long, stout, sub-terete, and, like the midribs underneath, red-purple; blades 5–9 cm. long, 3–4 cm. broad, oval-ovate, rounded at the base, obtuse at the apex, entire, thickish, deep-green and glabrous above, with the finely reticulate venation strongly impressed, underneath ferruginous, with the venation prominent; panicles ample, the branches subtended by reduced leaves, symmetrical, lax; pedicels 0.5–1 cm. long, slender, erect, slightly thickened upward, bearing a pair of purple, oblong bracts about 1.5 mm. in length; calyx 3 mm. long, 4 mm. broad, the ovate, obtuse sepals brown, the 8 black oval glands two-thirds as long; petals bright-crimson, 6 mm. long, limb slightly longer than the claw, strongly reflexed, the limb oval or obovate with rounded apex, plane, lightly auriculate, the margin slightly crisped; filaments bright-crimson, 2.5 mm. long, erect, slightly tapering upward; anthers gray, 1 mm. long, obtuse; ovaries 2 mm. long, ferruginous-pilose; style bright-crimson, 2 mm. long, not oblique, the stigma scarcely distinguishable.

"In wet forest-mould, climbing high upon trees, the flower light-red; scarce." Coripata, Yungas, May 15, 1894. (*No. 2192.*)

Banisteria cinerea sp. nov.

Branches much elongated, slender, terete, the youngest portions hoary; petioles 1 cm. long, stout, flat or shallowly grooved upon the upper side, the two ellipsoidal glands at the junction with the blade, 2 mm. long, black; blades 0.8–1.2 dm. long, 3.5–6 cm. broad, oblong or oval, blunt at the base, abruptly short-acuminate and acute at the apex, entire, coriaceous, above dark-green, drying brown, glabrous and shining, the midrib grooved, underneath silvery-gray with an exceedingly fine tomentum, but not shining, the stout, terete midrib and 7 or 8 pairs of slender secondaries prominent, the latter connected by the tertiaries and these with one another in a coarse reticulation; flowers panicled, racemed upon the

branches; panicles axillary, elongated, narrow, lax, long-peduncled, the branches subtended by very small lanceolate leaves; pedicels 4–10 mm. long, slender, subtended by lanceolate, acute bracts about 2 mm. long; calyx 2.5 mm. long, 4 mm. broad, closely subtending the globose-obovoid bud, truncate at the base, the glands nearly 1.5 mm. long, nearly as broad, the sepals broadly ovate, rounded at the apex, green; claw of petal 1.5 mm. long; limb 6 or 7 mm. long, orbicular, fringed, costate below; filaments reddish, the longer 2.25 mm. long, flattened and connate below; anthers 1 mm. long, the connective at the back expanded into a large black disk much broader than the thecae; ovary 1 mm. long, purple, obtusely pointed, the crest conspicuous; style 2 mm. long, straight; stigma distinct, whitish, truncate.

"In wet forest-mould, Unduavi; a low climber, the flowers yellow." (*No. 2489.*)

TETRAPTERIS PAPYRACEA Tr. & Pl. Ann. Sci. Nat. IV. **18**: 334. 1862. "Climbing to the height of 8 ft., in wet forest-mould. Flowers yellow." Road to La Paz, from Yungas, September, 1894. (*No. 2481.*)

GERANIACEAE

GERANIUM BANGII Hieron. Bot. Jahrb. **21**: 314. 1895. (*No. 1837.*) The same as *no. 788.*

Tropaeolum infundibularum sp. nov.

Glabrous; stems coarsely angled, the internodes mostly 4–5 cm. long; petioles 5–8 cm. long, slender, twining; blades 6–8 cm. long, and about as broad, triangular-ovate, the base truncate and lightly concave, abruptly short-acuminate and acute at the apex, entire or sinuately 1- or 2-lobed near the base, pale underneath, thin but semi-rigid, palmately 5-nerved, or mostly with an additional pair forming the margin near the petiole, the venation coarse, rather prominent underneath; peduncles 2 dm. or more long, very stout, tapering upward; spur 3 cm. long, 7 mm. broad at the base, as pressed, the terminal 1 cm. dilated, blunt, nerved, darker; remaining portion of the orange-colored corolla nearly 1.5 cm. long, 1.2 cm. broad, the lobes about 7 mm. long, broadly ovate, obtuse, bluish; fruit not seen.

"Abundant in wet forest-mould, climbing very high upon trees, the flowers rose and green." Uchimachi, Yungas, July 20, 1894. (*No. 2354.*)

OXALIS CORNICULATA L. Sp. Pl. 435. "Growing in wet clay, the yellow flowers open only in bright sunshine." Coripata, Yungas, April 15, 1894. (*No. 2128.*)

Oxalis nubigena Walp. Nov. Act. Nat. Cur. **19**: Suppl. 1 : 320. 1843.

Oxalis pubescens H.B.K. Nov. Gen. **5**: 240. (*No. 2814* or *2414*.) The same as *Mandon 851*, but I think not the same as *Rusby 748* and *751*, published under this name.

Oxalis boliviana Britton, Bull. Torrey Club **16**: 159. "Growing in wet mould." Coroico, September, 1894. (*No. 2449*.) The same as *Rusby 756*.

Oxalis Barrelieri L. Sp. Pl. ed. 2. 624. (*No. 2501*.)

Oxalis dendroides H.B.K. Nov. Gen. **5**: 250. (*No. 2675*.) The same as *Rusby 856*.

Oxalis Bangii sp. nov.

Ferruginous-pilose; plants densely tufted, sub-acaulescent; stipules 4–5 mm. long, 2 mm. broad, ovate, inequilateral, acuminate, brown and scarious, ciliate; petioles 2–3 cm. long, erect; leaflets 5–7 mm. long and broad, triangular-ovate, obcordate with a broad, shallow sinus, bright-green and slightly pilose above, purple and long-pilose underneath; peduncles two- or three-flowered in my specimens, nearly as long as the petioles; bracts lance-ovate and acuminate, 2–3 mm. long, of similar appearance to the stipules; pedicels 0.5–1 cm. long, pilose, weak but stoutish; calyx about 5 mm. long, lobed two-thirds of the way, the lobes oblong-ovate, obtuse; corolla about 1.5 cm. long, yellow. (*No. 2502*.)

RUTACEAE

Citrus Aurantium L. Sp. Pl. 783. Specimens taken from a "tree 20 to 30 ft. high, which gives several thousand fruits a year. The time for fruit is May, June and July, but in cold places like this, there are fruits up to November, on the same tree." Calapampa, July 4, 1894. (*No. 2309*.)

Citrus vulgaris Risso, Ann. Mus. Par. **20**: 190. 1813. "Much smaller than the common tree; the fruit also much smaller, with a bitter taste. Local name 'Mandarinos.'" Coroico, September 4, 1894. (*No. 2412*.)

Zanthoxylum pubescens St. Hil. & Tul. Ann. Sci. Nat. II. **17**: 141. "A shrub, 6 ft. high, growing in shade, in gravel and clay; scarce." (*No. 2177*.) The same as *no. 462*.

SIMARUBACEAE

Benjamina sp. "A shrub about 6 ft. high in dry gravelly soil along road." Coroico, September, 1894. (*No. 2473*.)

BRUNELLIA RHOIDES Rusby, *ante*, page 310. (*No. 1991.*) The same as *no. 839.*

BURSERACEAE

Bursera amplifolia sp. nov.

Glabrous; branchlets stoutish, straight; petioles 3–5 cm. long, stout, sub-triangular in section; leaflets one or two pairs, when two, separated by about 3 cm.; petiolules about 3 mm. long, very stout, the terminal about 1.5 cm. long; blades 7–12 cm. long, 3–6 cm. broad, the lower smaller, inequilaterally ovate, rounded at the base, short-pointed and obtuse at the apex, entire, thickish and rigid, bright-green; venation obscure above, somewhat prominent underneath, the secondaries about 12–16 very unequal and irregular pairs, slender, somewhat crooked; panicles axillary, on slender spreading peduncles about 2–3 cm. long, the flowering portion about 4 cm. long, and nearly as broad, loose, the bracts 1–3 mm. long, ovate, thickish, green; buds 2.5 mm. long and broad, ovate, acutish; calyx saucer-shaped, closely investing the corolla, the lobes subsemicircular; petals 3 mm. long, 1.5 mm. broad, ovate, obtuse; stamens 2 mm. long, the filament a little longer than the anther; disk large, flat, fleshy, white, irregularly many lobed; ovary ovoid, 1 mm. long, the style short, the stigma lightly 3-lobed.

"A tree, 15 feet in height, with yellow flowers, growing in sandy and gravelly soil, near the river." Coroico, August 4, 1894. (*No. 2370.*)

MELIACEAE

GUAREA OVALIS Rusby, Mem. Torrey Club 4: 205.

Fruiting specimens of what appears to be this species are received under the number *2428* (perhaps distributed as *no. 2828*). The fruiting panicles are very lax and slender, 2 dm. or more long and about 7 cm. broad, on very stout peduncles 3–6 cm. long. The pedicels are about 5 mm. long, very stout, upwardly thickened. The fruit is fig-shaped, about 1 cm. broad, bright-brown, light-verrucose. The specimens are gray- or yellow-pubescent throughout, especially the veins underneath; the upper leaf-surfaces very finely puberulent.

"A single tree found, about 20 ft. high, in forest-shade." Coroico, September 12, 1894.

Trichilia Harmsii sp. nov.

Glabrous, or the lower leaf-surfaces minutely tuberculate, as though strigose with the hairs aborted; branchlets stout, verrucose with the conspicuous, vertically elongated lenticels; petioles about 5 cm. long, stout, channeled, abruptly enlarged at the base; rachis

1–1.5 dm. long, the leaflets 4 or 5 pairs, sub-opposite, their petiolules 2–3 mm. long, very stout, the terminal 1 cm. long; blades 6–12 cm. long, 3–4 cm. broad, the upper lanceolate, the lower ovate, mostly inequilateral, rounded at the base, short-acuminate and obtuse at the apex, entire, coriaceous, dark-green, the venation inconspicuous on both sides, except the midrib, which is prominent beneath and in a groove on the upper surface; budding panicles 6–10 cm. long, 3–4 cm. broad, very lax, the rachis strongly angled; pedicels very short and stout; buds 1.5–2 mm. long, rounded at the apex; calyx saucer-shaped, 1.5 mm. broad, closely investing the base of the corolla, the lobes broadly ovate; petals 1.5 mm. long, 1 mm. broad, oval; stamens 1.5 mm. long, the tube completely divided, densely white-pilose, the segments entire at the apex; anther nearly a third the length of the filament; ovary 1 mm. long and broad, ovate; style short and thick; stigma large, capitate; disk saucer-shaped, closely enclosing the base of the ovary. (*No. 2660.*) Species dedicated to Dr. H. Harms, who has kindly indicated its affinity to *T. multiflora*.

ILICINEAE

? Ilex amygdalifolia Rusby, Mem. Torrey Club 3^3: 14. "A tree 20–25 ft. high, growing in black forest-mould, on the mountain side." Above Coripata, Yungas, April 18, 1894. (*No. 2129.*) The same as specimens collected by *Spruce* at Tarapota.

CELASTRACEAE

? Maytenus verticillata (R. & P.) DC. Prodr. **2**: 10. (*Celastrus verticillatus* R. & P. Fl. Per. **3**: 6.) (*No. 1774.*)

Maytenus sp., apparently undescribed, but only empty capsules remain. (*No. 1928.*)

Salacia rotundifolia sp. nov.

Glabrous; branches slender, the old portions dark-purple and strongly verrucose, the younger portions green and smooth; petioles nearly 1 cm. long, stoutish, broadly channeled above; blades 5–6 cm. long, 3.5–5.5 cm. broad, oval to rotund, obtuse at the base, very abruptly, very shortly and obtusely pointed at the apex, obscurely sinuate, thickish, pale-green, the venation very slightly prominent above, more so underneath, the secondaries about 10 pairs, the veins coarsely and angularly reticulate; peduncles of the cymes 1.5–2 cm. long; cymes 3–4 cm. broad, loose, much branched, the branches mostly at right angles, bracted with very small, ovate bracts; pedicels 1–1.5 mm. long, very stout; calyx 2 mm. broad, very shallow, lobed half-way or more, the lobes very broad, rounded, the sinuses acute; petals 1.5 mm. long, nearly rotund, thick;

stamens a little exceeding the pistil, the filaments very broad at the base, fleshy, the anthers very small; style cylindrical, short, half as thick as the ovary.

"Flowers green. Climbing very high on trees in dry forest-mould." Coroico, September 3, 1894. (*No. 2407.*)

SALACIA sp., apparently undescribed, but the specimens are in bud only. "Grows in dry mould and climbs to a height of 20 feet. Flowers greenish-yellow." Coroico, September, 1894. (*No. 2456.*)

RHAMNACEAE

RHAMNUS BOLIVIANA Rusby, Mem. Torrey Club 3^3: 15. (*No. 2522.*)

Rhamnus citrifolia sp. nov.

Gray-tomentellate except the upper leaf-surfaces, which are bright-green, drying yellowish, and sparsely puberulent; stipules caducous, 5 mm. long, lance-linear, finely attenuate; petioles 1–1.5 cm. long, stout, channeled, underneath strongly wrinkled or pseudo-costate; blades 6–10 cm. long, 3–5 cm. broad, oblong to oval or slightly obovate, rounded at the base, abruptly very short-pointed and mostly obtuse at the apex, finely and irregularly short-serrate, becoming entire toward the base, thickish and rigid, the midrib lightly channeled above; venation slender but prominent underneath, the secondaries 10 or 11 pairs; racemes sessile or short-peduncled, the bracts inconspicuous; pedicels 3–5 mm. long, spreading or recurved; calyx-tube regularly hemispherical, 2.5–3 mm. long, dark, the lobes of about the same length, much lighter, broadly triangular-ovate, acute; petals 1 mm. long, 1.5 mm. broad, concave, the margins incurved to partly surround the stamen, which is shorter, the anther small, on a filament longer than itself; ovary densely white-pilose, 1 mm. long, 1.5 mm. broad; style nearly 1 mm. long, 0.5 mm. thick. (*No. 1891.*)

SAPINDACEAE

(Contributed, except *Llagunoa*, by Dr. L. Radlkofer)

SERJANIA RETICULATA Camb. in A. St Hil. Fl. Bras. Mer. 1 : 359. *forma genuina.* (*No. 2816.*) The same as *no. 413.* (Two plants were distributed under *no. 2816.*)

SERJANIA RUBICAULIS Benth.; Radlk. Monog. Serj. 254. (*No. 2622.*)

SERJANIA OVALIFOLIA Radlk. quodammoxo recedens foliolis subintegerrimis, impunctatis, epidermide mucigera. (Specimen without number.)

Serjania lethalis St. Hil. Pl. Rem. Brés. **1**: 206, 235. "Growing in mould and yellow clay, and climbing to a height of 30 feet or more. Flowers white." Coroico, August 12, 1894. (*No. 2377.*)

Serjania sphaerococca Radlk. Monog. Serj. 153. (*No. 2623.*)

Serjania areolata Radlk. Monog. Serj. Suppl. n. 14. "Plant grows in gravel, along roadside, and climbs to a height of about 8 feet. Flowers *yellow*." Coroico, September, 1894. (*No. 2444.*)

Serjania grandiceps Radlk. Bull. Torrey Club **25**: 336. 1898. (Specimens without number.)

Cardiospermum Halicacabum microcarpum Bl. "A small plant climbing to a height of 4–6 feet, in cultivated ground. Flowers white." Coripata, Yungas, March 28, 1894. (*No. 2110.*)

Paullinia dasystachya genuina Radlk. Bull. Torrey Club **25**: 337. 1898. (*No. 2815* or *2415.*)

Allophylus punctatus (Poepp.) Radlk. Mem. Torrey Club **6**: 21. (*Schmidelia punctata* Poepp. Nov. Gen. et Sp. **3**: 38. *pl. 244.*) "A tree about 10 ft. high, growing in dry, gravelly soil. Flowers white." Coroico, September 2, 1894. (*No. 2405.*)

Allophylus cinnamomeus Radlk. Bull. Torrey Club **25**: 336. 1898. (*No. 2236.*)

Cupania vernalis Camb. in St. Hil. Fl. Bras. Mer. **1**: 387. (*No. 2254.*)

Matayba boliviana Radlk. Bull. Torrey Club **25**: 336. 1898. "A tree about 15 ft. high, with white flowers, growing in rich forest, near river." Coripata, April 23, 1894. (*No. 2171.*)

Llagunoa Mandoni sp. nov.

Branchlets grayish-brown with prominent leaf-scars, the internodes only about 4 mm. long; petioles 6 mm. long, margined, showing no indications of lateral leaflets, blades 3–6 cm. long, 2.5–4 cm. broad, oval-ovate, acutish, rounded to subcordate at the base, serrate with short, broad teeth, puberulent on the veins underneath; flowers not seen; fruits solitary, the stoutish peduncles 1.25–2 cm. long; fruiting calyx-segments oval, 6–7 mm. long, thickish; fruits 2 cm. broad after expansion, pale-green externally, light-brown internally; seed black, 5 mm. long. (*No. 1928.*) Collected also by *Mandon*.

ANACARDIACEAE

DUVAUA FASCICULATA Griseb. Goett. Abh. 19: 116. 1874. (Specimen without number.) The same as a specimen collected by *Hieronymus* at Cordoba, August 20, 1877.

LOXOPTERYGIUM sp. (*No. 2255.*)

LEGUMINOSAE

CROTALARIA INCANA L. Sp. Pl. 716. "Grows 2 or 3 ft. high, in dry clay; the flowers yellow." Coripatá, March 18, 1894. (*No. 2069.*)

CROTALARIA PTEROCAULA Desv. Jour. Bot. 3: 76. 1814. "A small plant growing in dry clay and gravel, on the hills above Coripata, the flowers yellow; scarce." March 26, 1894. (*No. 2116.*)

LUPINUS HUMIFUSUS Benth. Pl. Hartw. 169. (*No. 1836.*)

LUPINUS PANICULATUS Desr.; Lam. Encyc. 3: 625. (*No. 1883.*) The same as *Mandon 682.*

Lupinus cuspidatus sp. nov.

Pilose, the older portions sparsely so, the hairs mostly appressed; stems stoutish, coarsely angled; stipules 1.25 cm. long, 3 mm. broad, the body lance-oblong, abruptly or gradually contracted into the narrowly linear attenuation, which comprises nearly half the length; petioles 3–6 cm. long, slender; leaflets mostly 7, the largest 3–4 cm. long, 1–1.25 cm. broad, oblong to oblanceolate, acute at the base, at the apex blunt but tipped with a slender acute cusp 1–2 mm. long, thin, the midrib prominent underneath, the venation inconspicuous; peduncle elongated, stout; panicle about 4 cm. broad; bracts similar to the stipules, but smaller, early deciduous, the pedicels mostly 2 or 3 together, about 7 mm. long, weak; lower lip of calyx 8 mm. long, strongly compressed, acute, the apex lightly incurved, the upper 7 mm. long; corolla white or whitish, the vexillum nearly 1.5 cm. long and almost as broad, the strong folds yellow or brown, the wings 1.5 cm. long, nearly 1 cm. broad, the keel strongly incurved; fruit not seen. (*No. 1981.*)

Lupinus macrostachys sp. nov.

Long and coarsely yellow-hirsute, the hairs somewhat shining; root vertical, elongated, slender, simple; stems 3–4 dm. long, stoutish but weak, ascending, coarsely angled, densely leafy; stipules more or less adnate to the petioles at the base, the free portion about 0.75 cm. long, linear-attenuate, thin; petioles 5–7 cm. long, weak; leaflets mostly 9, the largest 3.5–7 cm. long, 0.75–1.25 cm. broad, oblanceolate, acute at the base, minutely

pointed at the apex, the point green; leaf thin, yellowish-green, the midrib lightly prominent on both sides; peduncle short, stout, coarsely angled, the raceme 1.5–4 dm. long, about 3 cm. broad; bracts blue, mostly 7–8 mm. long, linear-attenuate; pedicels about 5 mm. long; campanulate tube of the dark-blue, hirsute calyx 2 mm. long, the keel 1 cm. long, 4 mm. broad when flattened out, acuminate, the upper lip 8 mm. long, its two teeth 3 mm. long, acute; corolla bright-blue, the vexillum 1.25 cm. long and broad, or a little broader, the wings 8 mm. broad, the basal auricle large, rounded, the keel nearly 1.5 cm. long, the apex acute, of a very deep blue; legume 2.5 cm. long, nearly 1 cm. broad, oblanceolate, very short-pointed, acute, densely hirsute, the persistent corolla enclosing the narrow, empty base, 2-seeded, so far as seen, the seeds 4 mm. long, oval or obovoid, flattened. (*No. 1941.*)

Lupinus macrostachys sessiliflorus var. nov.

Plant half as large, the flowers sessile, two-thirds of the size, the vexillum with a narrow, thickened, white summit (apparently abnormal), the keel with a white base. (*No. 1982*).

Trifolium amabile H.B.K. Nov. Gen. **6**: 503. (*No. 2819.*)

Psoralea lasiostachys Vogel, Nov. Act. Nat. Cur. **19**: Suppl. 1: 13. 1843. "A shrub 6 ft. high growing in mould and clay, the flowers blue; not plentiful." Coroico, July 14, 1894. (*No. 2341.*)

Psoralea mexicana (L. f.) A. M. Vail, Bull. Torrey Club **21**: 119. 1894. (*Indigofera mexicana* L. f. Suppl. 335.—*Psoralea Mutisii* Kunth, Mim. 191. *pl. 54.*) (*No. 2060.*) The same as *158.*

? Coursetia grandiflora Benth.; Oerst. Kjoeb. Vidensk. Meddel. 10. 1853. (*No. 1899.*) The same as *Mandon 707.*

Coursetia boliviana Britton, Bull. Torrey Club **16**: 260. 1889. (*No. 1810.*) The same as *Rusby 1047* and *1344.*

Astragalus uniflorus D.C. Astrag. 243. *pl. 50.* (*Nos. 1792* and *1879.*)

Astragalus capitellus Britton, Bull. Torrey Club **16**: 260. 1889. (*No. 1990.*) The same as *Rusby 1005.*

Chaetocalyx brasiliensis (Vogel) Benth. in Mart. Fl. Bras. **15**[1]: 75. (Specimen without number.) The same as *Rusby 2398.*

Aeschynomene falcata DC. Prodr. **2**: 322. Coripata, Yungas, March, 1894. (*No. 2820.*)

Aeschynomene brasiliana (Poir.) DC. Prodr. **2**: 322. (*Hedysarum brasilianum* Poir. Encyc. **6**: 448.) "Abundant in dry, gravelly soil, the flowers yellow." Coripata, March 8, 1894. (*No. 2082.*)

STYLOSANTHES JUNCEA Micheli, Mém. Soc. Phys. Genèv. 28[7]: 19. 1883. (*No. 2150.*)

ARACHIS HYPOGAEA L. Sp. Pl. 741. "Requires good soil; cultivated; local name 'Mani.'" Coripata, April 24, 1894. (*No. 2149.*)

MEIBOMIA CAJANIFOLIA (H.B.K.) Kuntze, Rev. Gen. 195. (*Hedysarum cajanifolium* H.B.K. Nov. Gen. 6: 525. *pl. 598.*) (*No. 1987.*) The same as *Rusby 965.*

MEIBOMIA BARBATA (L.) Kuntze, Rev. Gen. 195. (*Hedysarum barbatum* L. Syst. ed. 10. 1170.) "Abundant in dry, gravelly soil, the flowers pale-blue." Coripata, March 11, 1894. (*No. 2085.*)

Meibomia variegata sp. nov.

White-pilose, the hairs mostly appressed; stems slender, elongated, purple below, striate; petioles 4–5 cm. long, slender, striate; lateral leaflets very short-petiolulate, 4–5 cm. long, 1.75–2.25 cm. broad, ovate, rounded at the base, minutely apiculate at the obtuse apex, entire, very thin, bright-green with an irregular, pale middle patch, the very slender yellowish venation lightly prominent, especially underneath, the strongly ascending secondaries about 6 pairs; terminal leaflet 0.75–1.25 cm. distant from the lateral, nearly a half larger; panicle very large, very loose and open, leafy, the very slender branches 1–1.5 dm. long, very loosely few-flowered; bracts caducous, 3–4 mm. long, ovate, long-attenuate; pedicels mostly 2 together, about 1 cm. long, filiform; calyx long-pilose, the tube 1 mm. long, broadly campanulate, the lobes lanceolate, attenuate, the longest 4 mm., the shortest nearly 3 mm. long; corolla nearly 8 mm. long, light-purple; stamens 7 mm. long, one free from the others, distinct at the summit for 1 mm., the pistil a little longer; ovary not stipitate; legume of about 3 joints, one suture very lightly, the other deeply sinuate, the joints about 8 mm. long, 5 mm. broad, the middle one a little shorter and nearly semicircular. (*No. 2817.*)

VICIA SETIFOLIA H.B.K. Nov. Gen. 6: 500. (Specimen without number.)

BRADBURYA sp. nov. An undescribed species of this genus was distributed, but our one specimen was lost and description cannot be written. (*No. 2328*, in part.)

ERYTHRINA RUBINERVIS H.B.K. Nov. Gen. 6: 434. "A tree about 40 ft. high, growing in wet clay; the flowers dark-red. Local name 'Saibo.'" Coroico, September, 1894. (*No. 2438.*)

GALACTIA GLAUCESCENS H.B.K. Nov. Gen. 6: 431. "Grows

on dry, gravelly hillsides; the flowers pale-blue." Coripata, March 15, 1894. (*No. 2084.*)

CANAVALIA OBTUSIFOLIA DC. Prodr. **2**: 404. "Climbing on high trees in the forest; the flowers blue." Coripata, May 15, 1894. (*No. 2195.*) Mr. Bang's use of the word "blue" here is unquestionably an error, as the flowers are present and are purple rather than blue.

? PHASEOLUS TRUXILLOIDES H.B.K. Nov. Gen. **6**: 451. (*No. 2269.*)

PHASEOLUS ERYTHROLOMA Mart. in Benth. Ann. Mus. Vind. **2**: 132. "Climbing 4–6 ft. in dry rocky and clayey soil, the flowers violet." Abundant at Coripata, April 26, 1894. (*No. 2163.*)

Phaseolus vignoides sp. nov.

Shortly ferruginous-tomentose; branches elongated, very slender; stipules 3–5 mm. long, oval, obtuse, finely nerved; petioles 3–5 cm. long, stoutish, weak; petioles of the lateral leaflets 2 mm. long, very stout, the blades 4–5 cm. long, 2.5–3 cm. broad, ovate, lightly inequilateral, rounded at the base, short-acuminate and acute, thin, yellowish-green, 3-nerved, the venation inconspicuous above, with the nerves lightly impressed, prominent underneath, the secondaries 3 or 4 irregular pairs, strongly ascending; flowering peduncles 1–1.5 dm. long, stout, terete, few-flowered; bracts thick, blackish, 3–5 mm. long, ovate or oval, obtuse; calyx 1 cm. long, 1.5 cm. broad at the mouth, campanulate, lobed half-way, the lobes sub-rotund, the two upper completely united into one of similar form but broader and entire, thick, rigid, tomentose; vexillum 4 cm. broad, suborbicular, thickish, slightly emarginate, its claw short and broad, the auricles strongly inflexed, except their narrow apices which are deflexed to form a narrow tail about 3 mm. long; body of wing 2.5 cm. long, 1.5 cm. broad, inequilaterally obovoid, the apex rounded, its auricles coherent to the auricles of the keel, all the auricles together forming a several-winged body about 5 mm. long; claws about 8 mm. long; keel shorter than the wings, obtuse, spirally twisted; united portion of filaments about 2.5 cm. long, downwardly broadened, the free portions capillary, nearly 1.75 cm. long, the anthers uniform, 1.5 mm. long, lance-oblong, obtuse; style inflated, bearded underneath the small terminal stigma; legume (but one seen) 7 cm. long, 6 mm. broad, acute, the margins slightly thickened; seed 5 mm. long, 3 mm broad.

"Climbing 10 to 15 ft., the flowers yellow and violet; abundant in wet mould near the roadside." Coroico, July 8, 1894. (*No. 2328.*)

Dolichos Lablab L. Sp. Pl. 725. (*No. 2821.*)

Dolicholus phaseoloides (Sw.). (*Glycine phaseoloides* Sw. Fl. Ind. Occ. 3: 1248.) "Grows in mould and clay near roadsides, not climbing high, the flowers brownish-white." Coroico, September 11, 1894. (*No. 2427.*)

Dolicholus sp. (*No. 2818* or *2418.*) This is the same as *Palmer 209* and *Blanchet 291*, which are referred to the last, but it appears to me distinct.

Dolicholus ovatus sp. nov.

Short-tomentose throughout; stems stoutish, coarsely angled; stipules about 7 mm. long, ovate, inequilateral, acuminate; petioles 2–3 cm. long, stoutish, lightly channeled above; petiolules of the lateral leaflets about 3 mm. long, very stout, the blades 4–7 cm. long, 2.5–4.5 cm. broad, ovate, truncate or rounded at the base, acuminate and acute, very inequilateral, thickish, the venation impressed above, prominent underneath; terminal leaflet 1–1.5 cm. distant from the lateral, about one-third larger, proportionally broader, 3-nerved; peduncles about 5 mm. long; racemes 0.5–1 dm. long; calyx-tube campanulate, 2 mm. long, 3 mm. broad; lower lobe 1 cm. long, lance-linear and tapering regularly from the base to the acute point, closely folded; lateral lobes 8 mm. long, lanceolate, long-acuminate and acute; two upper equaling the lateral, united to within 2 or 3 mm. of the tips, the free portions lanceolate, acuminate; standard 1 cm. long, 8 mm. broad, obovate, the keel 1.5 mm. long, broad, obtuse, the auricles 1 mm. long, broad and rounded but appearing acutish by the sharply infolded lower margin; wings 9 mm. long, the claw 1.5 mm. long, the auricle 1 mm. long, lanceolate, obtuse, salient, the body 3 mm. broad, united to the keel except about 2 mm. at the apex, the keel slightly longer; filaments united to within 2 mm. of the apex, the tenth distinct, the greenish, thick style equaling them, subulate, entire, obtusish; legume 2.5 cm. long, 1 cm. broad, the margins slightly thickened, narrowed at the base, very short-pointed; seed deep reddish-brown, 4 mm. long, not quite so broad, strongly flattened.

"Climbing slightly, in wet clayey soil; scarce; flowers yellow." Coripata, March 24, 1894. (*No. 2098.*)

Eriosema canescens sp. nov.

Canescent throughout with long, soft, appressed hairs; tuberous-thickened root cylindrical or fusiform; stems several from a woody crown, 5–8 dm. high, erect, slender, simple or nearly so, angled above; stipules 1.5 cm. long, 3–4 mm. broad, lanceolate, attenuate, sub-connate; petioles 3–5 mm. long, stout and broad; terminal leaflet 0.8–1.2 dm. long, 1–1.5 cm. broad, the lateral 6–9 cm. long; leaflets lance-oblong, on petiolules about equaling the petioles,

blunt at the base, obtuse but minutely apiculate at the apex, entire, thick and rigid, the venation strongly impressed above, the midrib and about 15 pairs of strongly ascending secondaries strongly prominent underneath; flowers not seen; pedicels of the fruits 7–12 mm. long, stout, erect; calyx-tube very short, the lobes unequal, 5–8 mm. long, linear, falcately curved, attenuate from the base, densely pilose; pod 1.5 cm. long, nearly 1 cm. broad, inequilaterally elliptical, minutely apiculate; seed 5 mm. long, compressed, dark-brown with the thicker margin white.

"Scarce, on dry gravelly hills; the flowers yellow." Coripata, Yungas, March 18, 1894. (*No. 2094.*)

? MACHAERIUM ANGUSTIFOLIUM Vogel, Linnaea **11**: 193. 1837.

"A tree 25–30 ft. high, growing in wet forest-mould, the flowers blue." Coripata, March 14, 1894. (*No. 2190.*) The same as *Rusby 2366.*

Machaerium Bangii sp. nov.

Stems and inflorescence ferruginous-tomentose; leaves pilose upon the veins; branches coarsely angled; branchlets elongated, dark, lightly angled; spines about 6 mm. long, 3.5 mm. broad at the base, lightly recurved, ferruginous; petioles 1–2 cm. long, stout, dilated at the insertion; leaves 1.5–2 dm. long, pinnate, the leaflets 12–15 on each side, alternate; petiolules about 1 mm. long, nearly as broad; leaflets 3–4.5 cm. long, 1–1.5 cm. broad, lance-oblong, rounded at the base, emarginate at the apex, thin, dark-green above, yellowish-green underneath with the midrib prominent, the venation obscure, the secondaries very numerous; panicle 3 dm. or more long and broad, loose and open; pedicels about 2 mm. long, stout; calyx thick, dark-purple, 5 mm. long, 4 mm. broad, campanulate, the base rounded or truncate, the mouth oblique, the short lobes triangular, obtusish with acute sinuses; orbicular, thick bractlets nearly half as long as the calyx; corolla dark-purple, thick, lightly pilose, abruptly flexed a little above the calyx; vexillum, exclusive of the short claw, 9 mm. long, 7 mm. broad, cordate at both ends; wing 8 mm. long, exclusive of the claw, 4 mm. broad, strongly auricled, the auricle semi-rhomboidal, 1 mm. broad; keel 6 mm. long, exclusive of the claw, not measured on the strong curve, the petals 3 mm. broad, obtuse; curve of stamens and pistil nearly a semicircle, the stamens equally diadelphous, the filaments thick; ovary oblanceolate, acuminate at both ends, long-stipitate, pilose.

"A shrub, not very tall, the stem very thorny, the flowers light-blue. In dry, sunny, gravelly places." Coroico, August 30, 1894. (*No. 2399.*) "Sometimes the Indians use the leaves instead of coca."

? DREPANOCARPUS LUNATUS (L. f.) G. Meyer, Primit. Fl. Esseq.

238. (*Pterocarpus lunatus* L. f. Suppl. 317.) "A shrub 10–15 ft. high, in dry, shaded locations, the flowers pale-blue, falling off very easily; scarce." Coripata, May 4, 1894. (*No. 2175.*)

Cassia bicapsularis L. Sp. Pl. 376. (*No. 2824* and probably also *no. 2658.*)

? Cassia pendula Willd. Enum. Hort. Berol. 440. (*No. 1985.*)

Cassia patellaria DC. in Collad. Hist. Cass. 125. *pl. 16.* "In and about coca-plantations and other cultivated grounds, the flowers yellow." Coripata, March 7, 1894. (*No. 2081.*)

Cassia sylvestris Vell. Fl. Flum. 169; 4: *pl. 78.* (*Nos. 2822* and *2823.*)

Cassia tomentosa L. f. Suppl. 231. (*No. 1782.*)

Cassia Tora L. Sp. Pl. 538. "Grows 2–5 ft. high in dry clay, the flowers yellow; scarce." Coripata, April 26, 1894. (*No. 2161.*)

Cassia Absus L. Sp. Pl. 376. (*No. 2139.*)

Mimosa soratensis Benth. Trans. Linn. Soc. 30: 427. 1875. (*No. 1780.*) The same as *Rusby 1299.*

? Mimosa asperata L. Syst. ed. 10. 1312. "A shrub 8–10 ft. high, growing in sandy places near the river; very sensitive; flowers a light red-rose color; scarce." Coripata, April 20, 1894. (*No. 2147.*)

Mimosa sp. (*No. 1812.*)

Acacia (*Vulgares*) **boliviana** sp. nov.

Unarmed, pubescent; branches stout, flexuous, sharply sulcate; branchlets slender, short, numerous, coarsely angled and sulcate; stipules 3–5 mm. long, lance-linear, obtuse, 3-nerved, thick, red; petioles about 3 cm. long, stout, sulcate, the entire leaf about 2 dm. long, 1 dm. broad, bipinnate, the pinnae 15–20 pairs, opposite, the lower shorter, very short-petiolulate, the petiolules obscurely glandular at the base; pinnules about 50–60 pairs, 4 mm. long, nearly 1 mm. broad, oblong, very inequilateral, truncate at the base, oblique and acutish at the apex, the venation obscure, dark-green; panicles mostly 1.5 dm. long, ascending, loose, the peduncles mostly 2–5-fascicled, 1–1.5 cm. long, lightly angled; heads about 1.25 cm. broad, densely flowered; buds globose, about 2 mm. in diameter; calyx campanulate, nearly 2 mm. long, the lobes oval, obtuse, thick; stamens 4–5 mm. long, yellow with a slight tinge of red; legume 4–6 cm. long, 1–1.25 cm. broad, the stipe about 7 mm. long, strongly flattened, with thickened margins, abruptly pointed, the point 3–4 mm. long, acute; about 5–7-seeded.

"A shrub 10 to 15 ft. high, with white flowers, abundant in dry clayey soil and slate." Coripata, February, 1894. (*No. 2070*, in flower; also a specimen in fruit, without number.)

Pithecolobium (*Samanea ?*) **coripatense** sp. nov.

Ferruginous-puberulent; branches short, stoutish, widely spreading, coarsely angled, densely leafy; stipules not seen; leaves bipinnate, the pinnae mostly 6 pairs, the pinnules 8–10 pairs; petioles 2–3 cm. long, stoutish, slightly dilated at the base, the petiolules similar, about 5 mm. long; pinnules subsessile, about 1 cm. long, 5–7 mm. broad, oblong-ovate, highly inequilateral, slightly falcate, the base truncate, angularly produced upon the lower side, minutely apiculate at the apex, deep-green, thickish, the venation prominent, especially underneath, the secondaries about 7 pairs; panicles shortly and stoutly peduncled, 3–5 cm. broad in the specimens, the branches suberect, the heads nearly 1 cm. broad, densely flowered; bud broadly obovoid, rounded at the summit, cinereous; calyx less than 1 mm. long, hemispherical-campanulate, shortly and obtusely toothed, the corolla 2 mm. longer, campanulate, divided about to the middle; stamens about 20–25.

"A shrub about 15 ft. high, with white flowers. One specimen found at Coripata, May 6, 1894, in dry clay, among other shrubs." (*No. 2176.*)

PIPTADENIA COLUBRINA (Vell.) Benth. Jour. Bot. Hook. 4: 341. 1842. (*Mimosa colubrina* Vell. Fl. Flum. 11: *pl. 16.*) "A stout tree, 40 ft. high, growing in wet clay and gravel, the timber good for building." Coripata, May 8, 1894. (*No. 2179.*)

INGA BOLIVIANA Britton, Bull. Torrey Club 17: 9. 1890. (*No. 1986.*) The same as *Rusby 990.*

INGA TENUIFLORA Salzm.; Benth. Lond. Jour. Bot. 4: 596. 1845. (*No. 2659.*)

Inga hirsutissima sp. nov.

Branchlets stout, terete, densely ferruginous-hirsute with spreading hairs; stipules persistent, mostly a little less than 1 cm. long, mostly broader than long, ovate, truncate or subcordate at the base, slightly pointed and acute at the apex, purplish-brown, cartilaginous and rigid, strongly many-nerved; leaves sessile, the rachis (upper leaves only seen) about 5 cm. long, by the wings 5–7 mm. broad; leaflets sessile, 4 pairs, the lowest 3–5 cm. long, 2–2.5 cm. broad, the uppermost 6–8 cm. long, 3–4 cm. broad, obovate, slightly inequilateral, rounded at the base, very abruptly short-pointed and acute at the apex, entire, thickish, the venation very lightly prominent above, more so underneath, the slender secondaries about 8 pairs; flowering peduncles 3 cm. long, stout, strongly angled; heads

short and dense, 3–5 cm. broad in full bloom; bracts 5 mm. long, broadly ovate, acuminate and acute, strongly nerved; calyx-tube about 4 mm. long,campanulate, the lobes of about the same length, regularly triangular-acuminate and acute, the sinuses about equaling them; calyx brown, thick, rigid, strongly nerved; styles apparently about twice the length of the stamens; fruit not seen.

"A slender tree 15 ft. high, with greenish flowers, in wet forest mould, scarce." Near Coroico, July 10, 1894. (*No. 2333.*)

Inga rugosa sp. nov.

Shortly and densely tomentose, ferruginous or gray, the branchlets coarsely angled; stipules not seen; petioles (only the uppermost seen) 5–10 cm. long, stout, very slightly margined; leaflets two pairs, 5–6 cm. apart, subsessile, the rachis margined; leaflets 1.5–2.5 dm. long, 0.6–1 dm. broad, the upper somewhat larger, ovate, oval or obovate, inequilateral, rounded at the base, acute at the apex, thick, the midrib lightly prominent above, strongly prominent underneath, like the 12–15 pairs of principal secondaries, each alternating with one or two short lesser ones, the upper surfaces slightly hard, the lower soft; peduncles axillary, and fascicled at the apex, 4–5 cm. long, very stout; heads elongated, dense, about 4 cm. broad; calyx-tube 4–5 mm. long, 3 mm. broad, campanulate, the upper half mostly a little contracted; lobes unequal, 3–5 mm. long, rigid, broadly ovate, acute; corolla about twice the length of the calyx, densely white-hirsute, the lobes 3 mm. long, ovate, obtuse; fruit not seen.

"A tree 20 to 30 ft. high, with white flowers, abundant in damp forest-mould, the timber used for building." Calapampa, Yungas, July 30, 1894. (*No. 2364.*) Species near *I. Miqueliana.*

ROSACEAE

Hirtella lightioides sp. nov.

Branchlets stout, spreading, purple, terete, papillose; stipules inconspicuous, 2 mm. long, lance-ovate; petioles 5 mm. long, very stout, ferruginous; blades 6–12 cm. long, 3–7 cm. broad, ovate or oval, rounded at the base, abruptly short-acuminate and obtuse at the apex, entire, thick and rigid, pale-green, above minutely scabrous and the veins lightly prominent, underneath finely stellate-scabrous, with the prominent veins strongly reticulate, the secondaries 12–14 pairs, connecting near the margin; inflorescence strongly ferruginous, the erect solitary loose panicles 6–10 cm. long, including the peduncle, which is of very irregular length, 2–3 cm. broad, the branches mostly cymosely 2-flowered; bracts 4–5 mm. long, lance-linear, attenuate and acute, the bractlets half as long, ovate; pedicels spreading, 3 mm. long, very stout, thickened

upward: sepals recurved, sub-equal, 4 mm. long, 3 mm. broad, oval, thick and rigid, green, lightly and bluntly keeled, ferruginous without, glabrous within, obscurely 3-nerved; petals sub-regular, 8 mm. long, 5–6 mm. broad, oval, slightly inequilateral, rounded at the apex, minutely clawed, purple, glabrous; filament-tube about 2 mm. high, the perfect stamens at length 2 cm. long, purple, the anthers deep-purple or blackish, nearly 1 mm. long, the three lower filaments 2–3 mm. long, very slender, white; style filiform, about equaling the filaments.

"A slender tree about 20 ft. high, with bright-blue flowers, scarce in dry forest-mould." Coroico, Yungas, September 7, 1894. (*No. 2418.*)

PRUNUS GUANAIENSIS Rusby, Mem. Torrey Club 6: 31. "A tree about 20 feet high, with white flowers, growing in forest-mould near river." Coripata, April 9, 1894. (*No. 2170.*) The same as *1432* and *Mandon 677*. A form with narrower leaves, with cuneate base, distributed as "*2170a*," may be distinct.

PRUNUS BRITTONIANA Rusby, Mem. Torrey Club 3[3]: 24. (*No. 1938.*) The same as *821*.

RUBUS BOLIVIENSIS Focke, Bremen Abh. 4: 158. 1874. (Or *Rubus* sp. nov.?) "Grows in hedges, and climbs to a height of 8 or 10 feet; the flowers white, the fruit edible. Local name 'Cari-cari.' Abundant." Coripata, April, 1894. (*No. 2141.*) The same as *Rusby 468*, in part. The limits of this species are extremely doubtful. *Rusby 468* includes two forms, which may well be distinct.

RUBUS BOLIVIENSIS (or sp. nov.?). "Along roadsides, climbing to a height of 6–10 feet, the flowers light-red." Coroico, July 24, 1894. (*No. 2361.*) There is little doubt that this number represents a distinct species, but I do not care to publish it until I know it better.

RUBUS GLAUCUS Benth. Pl. Hartw. 173. (*No. 1859b.*) The same as *Rusby 471*.

RUBUS MEGALOCOCCUS Focke, Bremen Abh. 4: 157. 1874. (*Nos. 1859a* and *1859c.*) The same as *1618*, *Mandon 662* and *Rusby 470*, but not *Rusby 476*.

Rubus bullatus sp. nov.

Coarsely hirsute-tomentose throughout, the stem and principal veins underneath armed with small, strongly recurved prickles; stipules becoming 1.5 cm. long, 2 cm. broad, irregularly ovoid, coarsely toothed, some inclined to be 3-lobed, foliaceous and of

similar texture to the leaves; petioles 3–5 cm. long, stout; blades 6–15 cm. long, 4–10 cm. broad, ovate, strongly cordate with a broad sinus, short-acuminate and acute, some 3-lobed with the lateral lobes much smaller and short and broad, irregularly crenate-dentate, thick, dark-green, finely and strongly reticulate, strongly bullate by the veins impressed above and very prominent underneath; panicles small and loose, with few spreading branches, leafy with small leaves similar to the stipules; pedicels nearly 1 cm. long, very prickly, the prickles slender, nearly straight; sepals occasionally prickly, 8 mm. long, 5 mm. broad, ovate, abruptly short-acuminate and acute, many purplish; petals 1 cm. long (white?), strongly veined; stamens shorter than the sepals, the filaments filiform, the anthers oval or sub-rotund; akenes (immature only seen) densely aggregated, densely white-pilose, tipped with the persistent, elongated, filiform, purple styles. (*No. 2235.*)

Fragaria chilensis Duchesne, Hist. Frais. 165; Mill. Gard. Dict. ed. 8. no. 4. (*No. 1961.*)

Potentilla lignipes sp. nov.

Pilose with long, appressed white hairs; base stout, woody, rough with black, imbricated, ovate, acuminate scales; stems numerous, 1–4 dm. long, slender, prostrate or ascending, branched, coarsely angled, the internodes mostly 3–5 cm. long; stipules about 7 mm. long, 2 mm. broad, lance-oblong, obtuse, sub-herbaceous; petioles 5–7 cm. long, very slender; blades 1.5–2 cm. long, 2–2.5 cm. broad, cordate, 5-foliolate, the leaflets oblanceolate to obovate, rounded at the apex, cuneate at the base, coarsely few-toothed, the lower teeth acute, the upper obtuse to rounded, the secondaries about 5 or 6 pairs, the venation prominent below, lightly impressed above; pedicels markedly exceeding the leaves, very slender; outer sepals 8 mm. long, exceeding the inner by 2 mm., lance-oblong, obtuse, the inner a little broader, acute; petals 8 mm. long and broad, obcordate, pale-yellow; stamens about 20, two-thirds the length of the sepals, the filaments stout, bright-purple, inserted into the densely white-pilose base of the calyx, the anthers ovoid, nearly 2 mm. long; ovary 0.5 mm. long, reniform, shining, green, the stout, straight style more than 1 mm. long, reddish. (*No. 1966.*)

Acaena elongata L. Mant. 200. (*No. 1821.*)

Acaena ovalifolia R. & P. Fl. Per. 1: 67. (Specimen without number.) The same as *Rusby 467.*

Eriobotrya japonica (Thunb.) Lindl. Trans. Linn. Soc. 13: 102. 1822. (*Mespilus japonica* Thunb. Fl. Jap. 206.) "A stout tree, 30 feet high, cultivated and escaped from cultivation, the flowers white, the fruit edible. Local name 'Mesperus.'" Coripata, February 28, 1894. (*No. 2066.*) The same as *Rusby 629.*

OSTEOMELES PERNETTYOIDES (Wedd.) Decne. Nouv. Arch. Mus. Paris 10: 184. 1874. (*Hesperomeles pernettyoides* Wedd. Chlor. And. 2: 230.) (*No. 1839.*) The same as *Rusby 1787.*

OSTEOMELES FERRUGINEA H.B.K. Nov. Gen. 6: 211. (*No. 1795.*) The same as a part of *no. 717*, which was inadvertently distributed as *Clethra brevifolia* Benth.

SAXIFRAGACEAE

ESCALLONIA ADSCENDENS Rusby, Mem. Torrey Club 6: 32. (*No. 1827.*) The same as *no. 1089.*

WEINMANNIA LAURINA H.B.K. Nov. Gen. 6: 51. "A small tree, with white flowers, growing in wet forest mould." Unduavi, September 2, 1894. (*No. 2484.*) Also collected by *Pearce* at Sandillana, 8,000 to 9,000 ft., April, 1866.

WEINMANNIA SORBIFOLIA H.B.K. Nov. Gen. 6: 57. (*No. 1988.*) The same as *311.* Also collected by *Triana*, in New Grenada.

Weinmannia rhoifolia sp. nov.

Younger portions and inflorescence tomentellate, otherwise glabrous; branchlets blackish, lightly sulcate; stipules 3 mm. long, oval or obovate with broad summits, thick; petioles 6–12 mm. long and, like the rachis, strongly winged, the wing strongly revolute and concave; blade 2.5–5 cm. long, mostly of 5 or 7 leaflets, which are sessile, 9–18 mm. long, 6–12 mm. broad, oblong-obovate, blunt, slightly narrowed at the base, the terminal more so, serrate, thick and coriaceous, pale-green above, brown underneath, the pale venation prominent on both surfaces; secondaries 10–12 pairs, forking at three-fourths of the distance to the margin and sending a branch into the next upper, and one into the next lower sinus; branches of the secondaries anastomosing about midway to form a crooked intermediate secondary; racemes solitary in the axils, 5–10 cm. long, including the short peduncle; inflorescence moderately dense, the fascicles mostly 5–7-flowered; pedicels slender, about 5 mm. broad, the lobes ovate, obtuse, thick; stamens slightly exceeding the styles; fruit not seen. (*No. 1989.*) Distributed as *W. sorbifolia.* The same as *Matthews 1436.*

RIBES ALBIFOLIUM R. & P. Fl. Per. 3: 12. *pl. 232, f. b.* "A shrub, 6 ft. high, with green flowers, growing in forest mould." Unduavi, September, 1894. (*Nos. 2487* and *1832.*)

HALORAGEAE

CALLITRICHE sp. (*No. 1887.*)

MYRTACEAE

PSIDIUM PYRIFERUM L. Sp. Pl. ed. 2. 672. (*Nos. 2830*, *2831* and *2832*.)

PSIDIUM POMIFERUM L. Sp. Pl. ed. 2. 672. (*No. 2829*.)

MYRTUS MICROPHYLLA H. & B. Pl. Aequin. **1**: 19. *pl. 4*. (*No. 1911*.)

MYRCIA PAIVAE Berg; Mart. Fl. Bras. **14**[1]: 179. (*Nos. 2827* and *2828*.)

MYRCIA LANCEOLATA Camb.; A. St. Hil. Fl. Bras. Mer. **2**: 329. (*No. 2826*.) The same as *no. 285*.

MYRCIA PRUNIFOLIA DC. Prodr. **3**: 253. (*No. 2825*.) The same as *Rusby 2693*.

Myrcia coroicensis sp. nov.

Inflorescence and younger portions ferruginous or more or less yellowish appressed-hairy; branchlets slender, strongly spreading, the internodes about 3–4 cm. long; petioles 5–7 mm. long, rather slender; blades 5–7 cm. long, 2–4 cm. broad, ovate, the base obtuse or abruptly acutish, the apex abruptly and strongly acuminate, the acumination obtuse, the upper surface glabrous except when very young; pilose upon the veins underneath, thickish, pale, the secondaries very numerous, the alternating ones stronger, a strong interconnecting line about 1 mm. from the margin, the surfaces rather finely reticulate, venation obscure above, rather conspicuous underneath; panicles terminal and in the upper axils, 6–10 cm. long, pyramidal, very loose and open, the branches very slender; mature buds globose, 2–2.5 mm. in diameter; calyx strongly tomentose on both surfaces, the tube broadly turbinate, rather longer than the broad lobes, extended between the ovary and stamens, becoming strongly recurved; style slender, tapering, 4–5 mm. (*No. 2276*.)

Very near *M. Paivae* Berg.

MELASTOMACEAE

DESMOSCELIS CALCARATA (Naud.) Triana, Trans. Linn. Soc. **28**: 34. 1871. (*Lasiandra calcarata* Naud. Ann. Sci. Nat. III. **13**: 127. 1850.) "Flowers large, white, fall on being touched. Grows in wet mould." Coripata, April 6, 1894. (*No. 2119*.)

TIBOUCHINA GRANULOSA (Desr.) Cogn. in Mart. Fl. Bras. **14**[3]: 340. (*Melastoma granulosa* Desr.; Lam. Encyc. **4**: 44.) *Nos. 1955* and *2227*.)

TIBOUCHINA BICOLOR (Naud.) Cogn.; DC. Monogr. Phan. **7**: 265. (*Chaetogastra bicolor* Naud. Ann. Sci. Nat. III. **14**: 128. 1850.)

"A shrub, 4 to 6 feet high, in clay along roadsides, the flowers dark blue." Coroico, September, 1894. (*Nos. 1956* and *2453*.)

TIBOUCHINA ORBIGNYANA Cogn.; DC. Monogr. Phan. 7: 261. (Specimen without number.)

TIBOUCHINA LONGIFOLIA Baill. Adansonia 12: 74. (*No. 2644*.) A specimen without number varies with broader, darker, nearly sessile leaves.

TIBOUCHINA GRACILIS Cogn.; Mart. Fl. Bras. 14^3: 386. (Specimen without number.)

TIBOUCHINA MEMBRANIFOLIA Cogn. Bull. Torrey Club 23: 17. 1896. (*No. 2857*.)

Tibouchina adenophora Cogn. sp. nov.

(Sect. *Diotanthera*); ramis acutiuscule tetragonis; junioribus petiolis pedunculisque pilis patulis brevibus glandulosis dense vestitis; foliis membranaceis, anguste ovatis, breviter acuminatis, basi rotundatis et leviter emarginatis, margine integerrimis, majoribus 7-nerviis, utrinque brevissime et densiuscule pilosis; paniculis majusculis, laxis, foliatis, multifloris; floribus sessilibus vel subsessilibus; calyce breviter denseque pilose, lobis triangulati-subulatis, tube multo brevioribus; staminibus leviter inaequalibus, filamentis glaberrimis, antheris linearibus superne longe attenuatis. Caulis lignosus robustiusculus, trichotome ramosissimus, ramis patulis, gracilibus: petiolus gracilis, 1–2 cm. longus: folia patentissima, supra obscure viridia, subtus viridi-cinerea, 9 cm. longa, 3–5.5 cm. lata: paniculae late pyramidatae, 0.5–1.5 dm. longae: calycis tubus anguste ovoideus, 4 mm. longus, dentes erecti, 1.5 mm. longi: petala ut videtur rosea, obovata, brevissime glandulosa, 4–5 mm. longa: antherae 3 vel 3.5 mm. longae: stylus crassiusculus, glaber, 7 mm. longus. (*No. 2645*.) Affinis *T. Rusbyi* Cogn. Bull. Torrey Club 17: 54.

Tibouchina obtusifolia Cogn. sp. nov.

(Sect. *Diotanthera*); ramis obscure tetragonis; junioribus petiolis pedunculisque setis brevissimis adpressisque dense vestitis; foliis mediocribus, rigidiusculis, anguste ovatis, apice obtusis vel obtusiusculis, basi subrotundatis, margine minute remoteque denticulatis, 5-nerviis nervis lateralibus latibreviter coalitis, supra setulis brevissimis subpatulis basi tuberculatis densiuscule vestitis, subtus brevissime denseque sericeo-villosis; paniculis satis parvis subfoliatis, dense submultifloris, floribus subsessilibus; calyce longiuscule adpresse denseque setuloso, lobis lineari-subulatis tubo paulo brevioribus; staminibus glabris, satis inaequalibus, majorum connectivo latibreviuscule producte. Caulis lignosus, satis gracilis, laxe ramosus, obscure tetragonus, ramis gracilibus, paulo compres-

sis, cinereo-fulvis: petiolus gracilis, 4–7 mm. longus: folia patula vel plus minusve reflexa, supra saturate viridia, subtus cinerea, 3.5–5.5 cm. longa, 17–26 mm. lata, superiora minora: paniculae 3–8 cm. longae: calycis tubus cinereus, ovoideus, 4 mm. longus, lobi erecto-patuli, 3 mm. longi: petala ut videtur rosea vel purpurascentia, obovato-oblonga, subtiliter ciliata, 10–11 mm. longa: antherae 5–6 mm. longae: stylus subfiliformis, glaber, 11 mm. longus. (*No 2646.*) Affinis *T. Brittonianae* Cogn. Bull. Torrey Club **17**: 55.

Tibouchina excoriata Cogn. sp. nov.

(Sect. *Diotanthera*); ramis obscure tetragonis, inferne demum excoriatis; junioribus petiolis pedunculis calycibusque breviuscule adpresse denseque pilosis; foliis rigidiusculis, ovatis, acutis, basi rotundatis, margine integerrimis, majoribus 7-nerviis, utrinque breviuscule subadpresse denseque sericeo-villosis; paniculis parvis, foliatis, plurifloris; floribus sessilibus vel subsessilibus; calycis lobis oblongis, acutiusculis, tubo dimidio brevioribus; staminibus satis inaequalibus, filamentis glaberrimis, antheris linearibus superne longe attenuatis. Caulis lignosus, robustiusculus, excoriatus, ramosissimus, ramis erecto-patulis, satis gracilibus: petiolus gracilis, 4–10 mm. longus: folia patula vel plus minusve reflexa, supra obscure viridia, subtus cinerea, nervis rubescentibus, majora 5.5 cm. longa et 3 cm. lata, superiora multo minora: paniculae subcongestae, 3–4 cm. longae: calycis tubus anguste obovoideus, cinereus, 4 mm. longus, dentes erecti, 2 mm. longi: petala flavescentia, obovata, vix ciliata, 4 mm. longa: antherae 3 vel 4–4.5 mm. longae: stylus filiformis, glaber, 6 mm. longus. (*No. 1992.*) Affinis *C. mollis* Cogn.

Tibouchina tetrapetala Cogn. Bull. Torrey Club **23**: 277. 1896. "A very common shrub, 4–6 ft. high, growing in sunshine, in clay and mould." Coroico, Yungas, September 10, 1894. (*No. 2425.*)

Brachyotum sanguinolentum (Naud.) Triana, Trans. Linn. Soc. **28**: 49. 1871. (*Chaetogastra sanguinolenta* Naud. Ann. Sci. Nat. III. **14**: 131. 1850. (*No. 2860.*)

Aciotis paludosa Triana, Trans. Linn. Soc. **28**: 51. (*No. 2647.*)

Calyptrella cucullata Triana, Trans. Linn. Soc. **28**: 72. *pl. 5, f. 60.* (Specimen without number.)

Diolena boliviensis Cogn. Bull. Torrey Club **23**: 277. 1896. (*No. 2574.*)

Leandra crenata (D. Don) Cogn.; Mart. Fl. Bras. **14**[4]: 137. (*Clidemia crenata* D. Don, Mem. Wern. Soc. **4**: 308. 1823.) (*No. 2629.*)

LEANDRA BOLIVIENSIS Cogn. Mem. Torrey Club 3^3: 29. (*No. 2859.*)

LEANDRA DICHOTOMA (D. Don) Cogn.; Mart. Fl. Bras. 14^4: 200. (*Clidemia dichotoma* D. Don, Mem. Wern. Soc. 4: 307. 1823.) (*No. 1994.*)

LEANDRA EROSTRATA (DC.) Cogn.; Mart. Fl. Bras. 14^4: 139. (*Clidemia erostrata* DC. Prodr. 3: 160.) (Specimen without number.)

LEANDRA sp. (*No. 1999.*)

MICONIA BRITTONII Cogn. Bull. Torrey Club 17; 92. 1890. (*No. 2231.*)

MICONIA BRITTONII GLABRATA Cogn. Bull. Torrey Club 23: 278. *2627.*)

MICONIA COELESTIS (Don) Naud. Ann. Sci. Nat. III. 14: 245. (Specimen without number.) The same as *Rusby 2279* and *2284.*

MICONIA CORDATA Triana, Trans. Linn. Soc. 28: 114. 1871. "A tree 20 feet or more in height, with yellow flowers, growing on cool, wet, forested hills. Scarce." Coripata, May 11, 1894. (*Nos. 1186* and *2995.*)

MICONIA CREMOPHYLLA Naud. Ann. Sci. Nat. III. 14: 228 (Specimen without number.) The same as *Rusby 2266.*

MICONIA CYANOCARPA Naud. Ann. Sci. Nat. III. 14: 221. (Specimen without number.)

MICONIA CYANOCARPA PARVIFOLIA Cogn. Bull. Torrey Club 23: 17. 1896. (*No. 2259.*)

MICONIA CYANOCARPA HIRSUTA Cogn. Bull. Torrey Club 23: 278. "A shrub, 6 to 8 ft. high, with white flowers, growing in good soil, along roadsides and in hedges, scarce." Coroico, August 16, 1894. (*No. 2387.*)

? MICONIA DIPSACEA Naud. Ann. Sci. Nat. III. 14: 138. (Speci men without number.)

MICONIA DOLICHORHYNCHA Naud. Ann. Sci. Nat. III. 14: 166 (*No. 2672.*) (The same as *Rusby 2252.*)

? MICONIA ELAEAGNOIDES Cogn.; Mart. Fl. Bras. 14^4: 390. (*No 2650.*)

MICONIA FLAVESCENS Cogn. Bull. Torrey Club 17: 93. 1890. "A shrub, 6 to 8 ft. high, with white flowers, growing in wet forest-mould." Unduavi, September, 1894. (*No. 2486.*)

MICONIA GLOMULIFERA Cogn. Bull. Torrey Club 23: 15. 1896. (*No. 1856.*)

MICONIA GRANULOSA (Bonpl.) Naud. Ann. Sci. Nat. III. **16**: 218. 1851. (*Melastoma granulosum* Bonpl. Melast. 25. *pl. 11.*) "A shrub, 8 ft. high, with white flowers, growing in forest-mould." Unduavi, September, 1894. (*No. 1485.*)

MICONIA HOLOSERICEA (L.) Triana, Trans. Linn. Soc. **28**: 101. 1871. (*Melastoma holosericeum* L. Sp. Pl. 390.) (*No. 1957.*) The same as *Rusby 2250.*

MICONIA HYGROPHILA Naud. Ann. Sci. Nat. III. **16**: 220. 1851. (*No. 2624.*)

MICONIA IBAGUENSIS (Bonpl.) Triana, Trans. Linn. Soc. **28**: 110. 1871. (*Melastoma ibaguense* Bonpl. Melast. 105. *pl. 45.*) (*No. 2002.*)

MICONIA LASIOCALYX Cogn. Bull. Torrey Club **23**: 278. 1896. "A shrub about 10 ft. high, with white flowers, growing in wet forest mould, in shade. Scarce." Calapampa, Yungas, July 16, 1894. (*No. 2344.*)

MICONIA MACROPHYLLA (Don) Triana. (*No. 1670.*) The same as *Rusby 2249.*

MICONIA MANDONI Cogn. Bull. Torrey Club **17**: 93. 1890. (*No. 1894.*)

MICONIA MICRANTHA Cogn. Bull. Torrey Club **23**: 16. 1896. (*No. 2858.*)

MICONIA MINUTIFLORA (Bonpl.) DC. Prodr. **3**: 189. (*Melastoma minutiflorum* Bonpl. Melast. 50. *pl. 22.*) (*No. 2223.*)

MICONIA MULTIFLORA Cogn. Bull. Torrey Club **17**: 60. 1890. "A shrub about 20 ft. high with rose-colored flowers, in clayey and gravelly soil, near water." Coripata, June 25, 1894. (*Nos. 2300* and *2651.*)

MICONIA NERVOSA (Sm.) Triana, Trans. Linn. Soc. **28**: 111. 1871. (*Melastoma nervosum* Sm. in Rees Cycl. **23**: no. 31.) (*Nos. 1997, 2001* and *2652.*)

MICONIA PLUMIFERA BANGII Cogn. Bull. Torrey Club **23**: 16. 1896. (*No. 2283.*)

MICONIA RESINA Naud. Ann. Sci. Nat. III. **16**: 226. 1851. (*Nos. 2626* and *2628.*)

MICONIA STENOSTACHYS DC. Prodr. **3**: 181. "A shrub about 5 ft. high, with yellowish-white flowers, in dry gravel and clay. Abundant." Coroico, September 6, 1894. (*No. 2416.*)

MICONIA TERNATIFOLIA Triana, Trans. Linn. Soc. **28**: 118. 1871. (*No. 2225.*)

Miconia theaezans subtriplinervia Cogn. Melast. 421. "A slender tree, about 20 ft. high, with green flowers, in wet forest-mould. Abundant." Coripata, Yungas, June 24, 1894. (*No. 2292.*)

Miconia theaezans glaberrima Cogn. Melast. 421. "A shrub about 15 ft. high, with greenish-white flowers, in wet forest-mould, the wood used for house building." Near Coroico, July 9, 1894. (*No. 2329.*)

Miconia undata robusta Cogn. Bull. Torrey Club **23**: 278. 1896. "A tree about 15 ft. high, with white flowers, in shade, in wet forest-mould." Calapampa, July 14, 1894. (*No. 2343.*)

Miconia uvifera Naud. Ann. Sci. Nat. III. **16**: 222. 1851. "A shrub, 6 to 8 ft. high, with light-red flowers, in yellow clay and mould, along roadside. Abundant." Calapampa, July 2, 1894. (*Nos. 2304, 2468** and *2654.*)

Miconia valida Cogn. Bull. Torrey Club **23**: 278. 1896. (*No. 2630.*)

Miconia amabilis Cogn. sp. nov.

(Sect. *Amblyarrhena*); ramis obtuse tetragonis et leviter quadrisulcatis; junioribus leviter stellate-furfuraceis praecipue in sulcis, vetustioribus glaberrimis laevibusque; foliis submembranaceis, longe petiolatis, ovato-oblongis, acutis vel acuminatis?, basi subrotundatis, margine integerrimis, leviter 5-nerviis, supra glaberrimis, subtus ad nervos nervulosque vix stellato-puberulis caeteris glabris; floribus 5-meris, paniculatis, congestis, non secundis, subsessilibus; calyce densiuscule stellato-furfuraceo breviter obtuseque 5-lobato; petalis apice rotundatis; stylo brevissime hirtello. Rami robusti, late virides: petiolus satis gracilis, glaber, 5–6 cm. longus: folia erecto-patula, supra saturate viridia, subtus satis pallidiora, circiter 2 dm. longa, 11–12 cm. lata, nervis nervulisque subtus satis prominentibus: paniculae strictae, anguste pyramidatae, dense multiflorae, 16–17 cm. longae: rami erecto-patuli, elongati, satis compressi, dense stellato-puberuli, satis ramulosi: calyx ovoideo-campanulatus, cinereo-fuscus, 3 cm. longus latusque: petala rubescentia, ovato-rotundata, 2 mm. longa: staminum filamenta crassiuscula, leviter glanduloso-pilosula, 2 mm. longa, antherae leviter arcuatae, 2 mm. longae: stylus crassiusculus, apice dilatatus, 4 mm. longus, stigmate subpeltato. (*No 2649.*) Affinis *M. Bangii* Cogn. Mem. Torrey Club **3**[3]: 30.

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* Of *2468* Mr. Bang writes "A shrub about 10 ft. high, with yellow flowers, in shade, in forest-mould. Coroico, Sept. 1894." I believe this must be found distinct from *2304*, but I do not know which is like the type. H. H. R.

Miconia latistigma Cogn. sp. nov.

(Sect. *Cremanium*); ramis junioribus petiolis pedunculisque brevissime denseque tomentosis; foliis longiuscule petiolatis, submembranaceis, anguste ovatis, oblique anguste longeque acuminatis, basi rotundatis vel vix emarginatis, margine integerrimis, 7–9-nerviis, supra pilis simplicibus brevissimis dense vestitis, subtus brevissime et densissime villoso-tomentosis; paniculis majusculis radae multifloris; floribus 5-meris, sessilibus, glomerulatis; calyce pilis patulis breviusculis eglandulosis dense vestito, lobis triangulari-subulatis tube dimidio brevioribus. Rami satis graciles obscure tetragoni, cinerei: petiolus robustiusculus, 3–4 cm. longus: folia erecto-patula, supra saturate viridia, subtus viridi-cinerea, 13–20 cm. longa, 6–10 cm. lata, nervis subtus satis prominentibus, nervulis paulo distinctis: paniculae latissime pyramidatae, circiter 1 dm. longae, ramis patentibus, elongatis, radae ramulosis: calycis tubus cinereus, campanulato-ovoideus, 2 mm. longus, lobi erecti, 1 mm. longi: petala obovata, apice rotundata, 1 mm. longa: antherae vix ⅔ mm. longae: stylus rectus, crassiusculus, 3–3.5 mm. longus, stigmate late-peltato. Affinis *M. uviferae* Naud. (Specimen without number.)

Miconia stellipilis Cogn. sp. nov.

(Sect. *Cremanium*); ramis teretiusculis, junioribus petiolis pedunculisque pilis brevissimis patulis papillosis apice stellatis dense vestitis; foliis rigidiusculis, breviter petiolatis, anguste ovatis vel ovato-oblongis, longe angusteque acuminatis, basi rotundatis, margine integerrimis, 5-nerviis, supra adnervos dense stellato-puberulis, caeteris primum stellato-furfuraceis demum glabris, subtus brevissime et densiuscule stellato-pilosis praecipue ad nervos nervulosque; paniculis majusculis, radae multifloris; floribus 5-meris, sessilibus, dense glomeratis, calyce breviter obtuseque lobato; stylo filiformi, apice truncato. Rami gracilis, juniores rubiginosi: petiolus robustiusculus, 6–9 mm. longus: folia patula, supra siccitate nigricantia, subtus cinereo-ferruginea, 8–16 cm. longa, 3.5–6.5 cm. lata: paniculae late pyramidatae, circiter 1 dm. longae, usque ad basin ramosae, ramis patentissimis: calyx late campanulatus, densiuscule stellata-furfuraceus, 1 mm. longus latusque: petala ovata, obtusa, 1 mm. longa: antherae circiter 0.5 mm. longae: stylus 2.5 mm. longus. (*No. 2653.*) Affinis *M. pulverulentae* Ruiz et Pav.

Tococa guianensis Aubl. Pl. Guian. 1: 428. (*No. 2668.*) The same as *Rusby 2242.*

Clidemia acutifolia Cogn. Mem. Torrey Club 3^3: 32. (*No. 1993.*)

Clidemia cordata Cogn. Bull. Torrey Club 17: 211. 1890. (*No. 2000.*)

Clidemia spicata (Aubl.) DC. Prodr. 3: 159. (*Melastoma spicatum* Aubl. Pl. Guian. 1: 423. *pl. 165.*) (*No. 1996.*)

Ossaea secundiflora Cogn. sp. nov.

(Sect. *Diclemia*); ramis junioribus petiolisque pilis brevissimis adpressis densissime vestitis; foliis breviter petiolatis, ovato-oblongis, longiuscule acuminatis, basi rotundatis, margine subtiliter serrulatis, leviter 7-nerviis, supra brevissime et densiuscule hirtellis, subtus brevissime denseque villosïs; floribus 4-meris, sessilibus, secus ramis paniculae secundis; calyce brevissime subsparseque pilosulo, minute 4-denticulato. Rami satis graciles, obscure tetragoni: petiolus satis gracilis, 1.5–3 cm. longus: folia membranacea, supra atroviridia, subtus satis pallidiora, 10–15 cm. longa, 5–7 cm. lata: paniculae laterales, sessiles, diffusae, 8 cm. longae, ramis divaricatis, filiformibus, elongatis, flexuosis: calyx nigricans, late campanulatus, 1.5 mm. longus, 2 mm. latus: petala triangulari-lanceolata, acuminata, 2–2.5 mm. longa: antherae lineari-oblongae, 1.5 mm. longae: stylus capillaris, 5 mm. longus. (No number.) Affinis *O. petiolaris* Triana. (*No. 1998.*)

LYTHRACEAE

Cuphea ianthina Koehne; Mart. Flor. Bras. **13**^{2}: 238. (*No. 2267.*) The same as *Rusby 1067.*

Cuphea pannoso-cortica sp. nov.

Scabrous; a widely much-branched shrub, the periderm separating in long strips, the short branchlets very slender, densely leafy; leaves subsessile, 0.5–1 cm. long, 3–5 mm. broad, ovate, slightly inequilateral, rounded at the base, obtuse, entire, ciliate, revolute-margined, the midrib very strong underneath; pedicels 5 mm. long, slender, thickened upward, purple; calyx 1.7 cm. long, 4–5 mm. broad at the mouth, infundibular, little narrower at the base, strongly nerved, bright-purple, the spur (yellowish-purple) 4 mm. long, 3 mm. broad, rounded; calyx-lobes very short; principal petals (bright rose-purple) 1 cm. long, 5 mm. broad, rounded at the apex, the midrib stout, broad, greenish-yellow; longest filaments (yellow with purple tips) exserted 3 mm.; anthers gray; style not exserted, broadly dilated at the yellowish base, purple above, the stigma capitate, very small. (*No. 2006*, in part.)

ONAGRACEAE

Epilobium andicolum Haussk. Oest. Bot. Zeits. **29**: 118. 1879. (*No. 1808.*)

Fuchsia macrantha Hook. Bot. Mag. *pl. 4233.* (*No. 2834.*)

Fuchsia dependens Hook. Ic. Pl. *pl. 65.* (*No. 2833.*)

Fuchsia corymbiflora R. & P. Fl. Per. **3**: 87. *pl. 325.* (*No. 1806.*)

SAMYDACEAE

Casearia obtusifolia sp. nov.

Softly puberulent throughout, except the upper leaf-surfaces other than the midrib; branchlets elongated, slender, flexuous, the internodes about 1 cm. long; stipules 2 mm. long, tapering from the base, caducous; petioles 5 mm. long, very stout; blades 6–8 cm. long, 3–4 cm. broad, oval, nearly elliptical, finely serrate, the teeth short and broad, obtuse or mucronate, thick, dark-green, somewhat shining above, with the finely reticulate venation impressed, strongly prominent underneath, the secondaries about 8 pairs; fascicles not very densely flowered; pedicels 1–2 mm. long, thick; sepals 5 mm. long, 3 mm. broad, oval or obovate, rounded at the summit, puberulent without; stamens 8, 4 mm. long, the filaments stout, the anthers ovate, acute, bright-yellow; staminodia 3 mm. long, fleshy or dilated, upwardly thickened, pilose and penicillate, adnate to the filaments for half the length; ovary broadly ovate, pilose, 3 mm. long; style 1.5 mm. long, the stigma capitate.

"A tree about 20 ft. high, with yellow flowers. But one found, in dry gravel and clay in forest." Coroico, September 8, 1894. (*No. 2421.*)

Abatia boliviana (Mandon & Weddell) Britton, Bull. Torrey Club **17**: 214. 1890. (*No. 1777.*) The same as *no. 1613.*

LOASACEAE

Sclerothryx fasciculata Presl, Symb. Bot. **2**: 3. *pl. 53; fide* Urban.

PASSIFLORACEAE

Passiflora foetida hirsuta Masters; Mart. Fl. Bras. **13**[1]: 583. (*No. 2008.*)

Passiflora nephrodes Masters, Bull. Torrey Club **17**: 282. 1890. (Specimen without number.) The same as *Rusby 494.*

Passiflora rubra L. Sp. Pl. 956. (*No. 2836.*)

Passiflora suberosa L. Sp. Pl. 958. (Specimen without number.)

Passiflora quadrangularis L. Syst. ed. 10. 1248. "Climbs over hedges in rich soil; flowers blue. The fruit is as large as a child's head and is edible, but has not a nice taste." Coripata, May 16, 1894. (*No. 2198.*)

Passiflora tricuspis Mart. Flor. Bras. **13**[1]: 587. (No number.) The same as *Rusby 496.*

Passiflora trisulca Masters, Bot. Jahrb. **13**: 218. 1887.

"Grows in forest-mould and climbs high upon trees; flowers greenish-blue." (*No. 2441.*)

Passiflora Bangii Masters, sp. nov.

(Sect. *Granadella*); ramulis glabris sulcatis cirrhatis; foliis distantibus, membranaceis, glabris; petiolis 4–5 cm. longis, glandulis stipitulatis 5–6 onustis; stipulis foliaceis, 2 cm. longis, oblique oblongis, acutis; laminis 9–10 cm. diam., suborbicularibus, cordatis, palmatim 3–5-nerviis, ad medium trilobis, lobis oblongis acutis; pedunculis 6–7 cm., gracilibus, 1-floris; bracteis (ut videtur) deciduis, a flore parum remotis; floribus diametro 5–6 cm., tubo glabro lato poculiformi; sepalis oblongo-lanceolatis, foliaceis, trinerviis, dorso subapice foliaceo-acuminatis; petalis albidis (?), oblongis, membranaceis, quam sepala parum brevioribus; corona fauciali filamentosa, pluriseriali, filis externis liguliformibus violaceis petalis paulo brevioribus, filis intermediis 2–3-serialibus violaceo-purpureis, capitatis, precedentibus dimidio brevioribus, filis intimis longioribus, versus apices uncinatis, inflexis; corona media a medio tubi emergente, membranacea, annulari; gynophoro crassiusculo, brevi, basi corona cupulari albida membranacea circumdato; filamentis latissimis oblongis obtusis apice filo brevissima antheram gerente munitis; ovario oblongo villosulo; stylis 3, crassiusculis apice clavate-dilatatis superato; fructu ut videtur oblongo, 6 cm. longi, glabro. (*No. 2224.*)

Passiflora erosa sp. nov.

Minutely and rather sparsely puberulent, or the upper leaf-surfaces strigose; branches slender, pale, strongly sulcate; stipules nearly 1 cm. long, ovate with attenuate acumination; tendrils simple; petioles 2–5 cm. long, slender; blades 0.5–1 dm. long and broad, cordate, deeply and angularly 3-lobed, the lobes acute, the margin sinuate, distantly toothed, the teeth very short, acute or apiculate, thin, deep-green, paler underneath, where the very slender pale-yellow venation is rather prominent and continued into the teeth; pedicels mostly geminate, 0.5–1.5 cm. long, recurved, setaceous-bracted; calyx-tube depressed-globose, 1 cm. broad, the lobes 1.5 cm. long, tapering from the base, which is 7 mm. broad; petals wanting in my specimens; crown treble, the outer about 1 cm. long, of numerous filiform divisions, the middle 2 mm. long, thin and delicate, white, the divisions ovate with toothed or lacerate margin, the inner short-tubular, with a free somewhat fleshy border; gynophore 7 mm. long; stamens 4, the filaments 5 mm. long, membranaceous, white, much dilated at the base, the anthers 2.5 mm. long, 2 mm. broad, triangular, obtuse; ovary globose-ovoid, 5 mm. long, downy; style filiform, 5 mm. long, the stigma capitate, 0.5 mm. broad; fruit 2 cm. broad, dark-blue, glaucous. (*No. 2272.*)

Carica boliviana sp. nov.

Only the summit of one plant seen. Glabrous; large leaf at base of inflorescence on a stout petiole 2.5 dm. long; blade rotund-obovate, 2 dm. long, rather broader, the base shallowly cordate, divided two-thirds of the way, the lobes one or two pairs, lance-ovate, rather inequilateral, shortly acuminate and acute, entire except the terminal, which sometimes has a few coarse teeth or lobes, very thin, dark-green above, drying yellowish-green underneath, the principal veins very strong and prominent, the others inconspicuous; smaller leaves of the inflorescence similar, about half as large; peduncles stoutish, about 1 cm. long, the pedicels articulated to the large nodose summit; pedicels slender, 0.5–1 cm. long; flowers 8 mm. long, none seen in an opened state; fruit (mature?) broadly oval, 3 cm. long, 2.5 cm. broad, the seeds 4 mm. broad.

"A shrub or tree about 10 ft. high without branches, in rich mould about houses, cultivated; flowers white; fruits dark yellow, larger than an egg." Calapampa, July 12, 1894. (*No. 2338.*) Apparently the same as *no. 1559.*

CURCURBITACEAE

Calycophysum pedunculatum villosum Cogn. Bull. Torrey Club **23**: 17. 1896. (*No. 2244.*) *fide* Cogniaux.

Melothria Hookeri Cogn.; DC. Monogr. Phan. **3**: 588. "In hedges, climbing 10 to 15 ft. high, the flowers white. Scarce.' Coripata, April 10, 1894. (*No. 2127.*) The same as *no. 258* and *Rusby 2065.*

Gurania boliviana Rusby, Mem. Torrey Club **3**[3]: 38. (*No. 2013.*)

Gurania costaricensis subtriloba Cogn. (Specimen without number.)

Anguria longipedunculata Cogn. Mem. Cour. Acad. Belg. 8vo. **27**:—. 1877. *fide* Cogniaux.

Anguria Warszewiczii Hooker, Bot. Mag. *pl. 5304.* (*No. 2666.*)

Cyclanthera brachybotrys (Poepp. & Endl.) Cogn. Mem. Cour. Acad. Belg. 8vo. **28**: 73. 1878. *fide* Cogniaux. (*Momordica brachybotrys* Poepp. & Endl. Nov. Gen. et Sp. **2**: 54.) "Climbing along the ground in clay and mud; flowers yellow." Coroico, September, 1894. (*No. 2467.*) The same as *Rusby 2059.*

Sicyos australis Endl. Prod. Fl. Norf. 67. "Creeping in wet mould, the flowers green. Scarce." Coripata, March 7, 1894. (*No. 2078.*)

BEGONIACEAE

Begonia Clarkei Hook. f. Bot. Mag. sub *pl. 5663* et *5675*. (*No. 1862.*)

Begonia bracteosa A. DC. Ann. Sci. Nat. IV. **11**: 132. 1859. (*Nos. 2837* and *2838.*)

Begonia glabra Aubl. Pl. Gui. **2**: 916. "In forest-mould, running along the ground and climbing on old stems; flowers beautiful, snow-white; scarce." Coroico, September 6, 1894. (*No. 2414.*) The same as *no. 1509.*

Begonia myriantha Britton, Bull. Torrey Club **27**: 35. (*No. 2665.*) The same as *Rusby 691.*

CACTACEAE

Opuntia sp. (no data). (*No. 2499.*)

Hariota salicornioides DC. Mem. Cact. 23. "Depending from old stems in the forest. Flowers white." Coripata, June 10, 1894. (*No. 2323.*)

Hariota crenata Britton, Bull. Torrey Club **18**: 35. 1891. "Depending from old stems in the forest. Flowers red." Coripata, June 10, 1894. (*No. 2322.*)

Cereus lasianthus K. Sch. ined. (Specimen without number.)

Cereus. — *Nos. 2497*, *2498* and *2499* are of this genus.

? Cereus Pasacana Web. (*No. 2052.*)

Phyllocactus latifrons Walp. Rep. **3**: 241. (*No. 2294.*)

UMBELLIFERAE

Hydrocotyle pusilla A. Rich. Ann. Sci. Phys. **4**: 167. 1820. "In wet clay, the flowers green." Coroico, September, 1894. (*No. 2442.*)

Hydrocotyle bonariensis Lam. Encyc. **3**: 153. (*No. 2270.*)

Azorella biloba Wedd. Chlor. And. **2**: 195. (*No. 1831.*)

Spananthe paniculata Jacq. Coll. **3**: 247. (*No. 2841.*)

Bowlesia lobata R. & P. Fl. Per. **3**: 28. (*No. 1884.*)

Eryngium paniculatum Cav. & Domb.; Delar. Eryng. 59 *pl. 26.* (*No. 1820.*)

Sanicula mexicana DC. Prodr. **4**: 84. "In forest-mould." Coroico, September, 1894. (*No. 2463.*)

ARRACACIA ANDINA Britton, Bull. Torrey Club **18**: 37. 1891. (*No. 2839.*)

Oreosciadium andinum sp. nov.

Glabrous; stems 0.5–1.5 dm. long in my specimens, very slender, erect or ascending; petioles of the radical leaves 2–6 cm. long, very slender, the sheath long and broad; blades 1.5–4 cm. long and broad, ternate, the divisions tapering into petiolules 0.5–1 cm. long, or in the larger leaves the petiolules distinct, the terminal about a half longer; divisions biternate or triternate, the ultimate segments oblong, acutish, 2.5–5 mm. long, entire; cauline leaves similar but smaller, becoming sessile; umbels subsessile, compound; peduncles of the branches 4–5 mm. long, very slender, finely and sharply angled; pedicels 2–3.5 mm. long, filiform but rigid, widely spreading, sharply angled; fruit (mature?) 1.5 mm. long, 1.25 mm. broad, ovoid, lightly compressed, blunt, obtusely ribbed. (*No. 1805.*)

ARALIACEAE

? DIDYMOPANAX MOROTOTONI (Aubl.) Decne. & Pl. Rev. Hortic. IV. **3**: 109. 1854. (*Panax Morototoni* Aubl. Pl. Gui. **2**: 949.) (*No. 2258.*)

SCIADOPHYLLUM PENTANDRUM (R. & P.) Poir. Encyc. **6**: 747. (*Actinophyllum pentandrum* R. & P. Fl. Per. **3**: 75 *pl. 311.*) "A kind of woody climber, climbing high, in forest, and growing in wet mould; flowers white, fleshy." Coripata, June 22, 1894. (*No. 2292.*) Not the same as *Rusby 549* and *609.*

DENDROPANAX ARBOREUM (L.) Decne. & Pl. Rev. Hortic. IV. **3**: 107. 1854. (*Aralia arborea* L. Pl. Jam. Pugill. **2**: 11.—Syst. ed. 10. 967.) (*No. 2245.*)

Dendropanax oblongifolium sp. nov.

Glabrous; branchlets stoutish, flexuous, apparently fleshy and strongly wrinkled in drying so as to appear angular, pale-gray, strongly leafy toward the summit; petioles very irregular, 0.5–4.5 cm. long, strongly channeled by the upturned margins, the base dilated and blackish; blades 5–12 cm. long, 2–3 cm. broad, oblong, somewhat inequilateral, the base acute to acuminate, the apex acuminate and obtusish, venation weak and, except the midrib, inconspicuous on both sides, the crooked secondaries 6–10 pairs; umbels clustered at the summit, 3–4 cm. long, bearing a few irregular, fleshy, ovate bracts about 2 mm. long and broad; umbels about 20-flowered, the pedicels 1.5 cm. long, slightly thickened at the summit; calyx blackish (as dried), campanulate, in anthesis about 5 mm. long by 4 mm. broad, the margin somewhat sinuately truncate, yellowish; style short, broadly conical.

"A scarce shrub, about 6 feet high and very slender, growing in wet shaded forest-mould." Calapampa, Coroico, July 16, 1894. Similar to *no. 2245*, but that is a tree. (*No. 2345.*)

OREOPANAX FULVUM E. March.; Mart. Fl. Bras. **11**: 254. "Very slender shrub about 20 ft. high, in dry forest-mould." Coroico, September, 1894. (*No. 2466.*)

OREOPANAX BOLIVIENSE Seem. Jour. Bot. 3: 272. 1865. (*No. 1892.*)

OREOPANAX MEMBRANACEUM Rusby, Mem. Torrey Club 3^3: 42. "A simple-stemmed shrub about 10 ft. high, in shaded forest-mould." Uchimachi, near Coroico, July 22, 1894. (*No. 2356.*)

Oreopanax grosseserratum sp. nov.

Staminate plant.

Younger portions of the branchlets and inflorescence densely, and both leaf-surfaces sparsely, dark-red glandular-scurfy; branchlets very stout, densely leafy; petioles 1–5 cm. long, slender; blades 6–12 cm. long, 2–4 cm. broad, lanceolate to oblanceolate, mostly blunt at the base, cuspidate at the apex, the margin very unequally and very coarsely serrate with cuspidate teeth, coriaceous and very thick, above shining and yellowish (in drying), with impressed veins, underneath pale-green, the finely reticulate venation prominent, the secondaries about 8–10 pairs; heads racemose, the raceme terminal, loose, about 6 cm. long, the heads about 10, globose, 1 cm. in diameter, their peduncles slender, 1–1.5 cm. long, at the base bracted, the bracts 5 mm. long, broadly ovate, acuminate; petals 5, purple, yellowish at the base, 4 mm. long, 1.5 mm. broad, lance-oblong, acutish; filaments slightly exceeding the petals, the anthers white, 1.5 mm. long; styles connate, crooked, shorter than the filaments. (*No. 1822.*)

Species near *O. avicennifolium*. The plant was at first regarded as of a distinct genus, but Dr. Harms kindly points out that the flowers, being staminate, may well have the styles connate.

CORNACEAE

CORNUS sp., probably undescribed. (*No. 1799.*)

CAPRIFOLIACEAE

VIBURNUM AYAVACENSE H.B.K. Nov. Gen. 3: 428. (*No. 2840.*)

VIBURNUM TINOIDES L. f. Suppl. 184. (*No. 1885.*)

RUBIACEAE

CINCHONA SUCCIRUBRA Pav.; Klotzsch, Abh. Akad. Berl. **1858**: 60. (*No. 2229.*) Cultivated?

Lygistum confertiflorum (Benth.). (*Manettia confertiflora* Benth. Linnaea 23: 443. 1850.) (Specimen without number.)

Cosmibuena grandiflora (R. & P.). (*Cinchona grandiflora* R. & P. Fl. Per. 2: 54 = *Cosmibuena obtusifolia* R. & P. Fl. Per. 3: 3.) (*No. 2055.*) The same as *Rusby 2103.*

ISERTIA HYPOLEUCA Benth. Jour. Bot. Hook. 3: 220. 1841. (Specimen without number.) The same as a specimen collected by *Purdie* in New Grenada.

COCCOCYPSELUM CANESCENS Willd.; Roem. &. Schult. Syst. Mant. 3: 130. "Grows underneath shrubs, in wet clay; flowers quite white. Similar to 270, but that has blue flowers; fruit blue." Coripata, April 26, 1894. (*No. 2153.*)

Coccocypselum Brittoni Rusby. (*C. glabrum* Britton, Bull. Torrey Club 18: 108. 1891. Not *C. glabrum* Bartl.) (*No. 2018.*) The same as *Rusby 2479.*

HOFFMANNIA PALLIDA Rusby, Mem. Torrey Club 3^3: 44. (*Nos. 2003* and *2004.*) The same as *no. 354.*

HOFFMANNIA BRACHYCARPA Britton, Bull. Torrey Club 18: 108. 1891. (*No. 2559.*)

SABICEA CANA Hook. Ic. Pl. *pl. 247.* (Specimen without number.) The same as *Rusby 1905.*

Randia boliviana sp. nov.

Branchlets short, stout, whitish; spines stout, terete, those of the twigs 1–1.5 cm. long; stipules 4 mm. long, broadly triangular-ovate, acuminate, acute, rigid; leaves sub-sessile by a narrowed base, 2–4 cm. long, 1–2 cm. broad, oval-ovate, abruptly narrowed into the short, petiole-like base, varying from acute to blunt or rounded at the apex, glabrous, slightly shining above, thin but rigid, drying blackish, the midrib slightly prominent above, broad and very prominent underneath, the slender, crooked secondaries 4–6 irregular pairs; flowers not seen; fruit very short-peduncled, 1.2–1.5 cm. long, globose or slightly broader above, smooth and shining, tipped by the stout calyx-tube which is 1 mm. long, 3 mm. broad, the strongly reflexed lobes 2–3 mm. long, lanceolate, acuminate and acute. (*No. 1773* and *1776.*)

The same as *Mandon 345*; also collected by *Pearce* at Peluchuco, June 1865.

ELEAGIA GRANDIS Rusby, Mem. Torrey Club 4^3: 208. (*No. 2863.*)

TOURNEFORTIOPSIS gen. nov.

Flowers hermaphrodite and perfect. Calyx-tube ovoid or oval, the limb tubular-campanulate, 5-lobed, persistent and somewhat accrescent. Corolla short-funnel-form, the tube straight, naked in the throat, 5-lobed, the lobes triangular-ovate, valvate, the summit inflexed and appendaged. Stamens 5, inserted about the middle of the tube, the filaments very short, the anthers oblong, dorsifixed a little below the middle, cordate, obtuse. Ovary 4–8-celled, the cells elongated-tubular, the ovules solitary in the cells, suspended; style equaling the corolla, thick, fleshy, sericeous, dilated at the base; stigma capitate. Fruit drupaceous, the flesh very scanty, the stone thick and bony, oval, shallowly 4–8-sulcate or ribbed; apical perforations not apparent, perhaps appearing after full maturity. Seeds suspended, linear, flattened, the embryo scanty, the radicle ascending, much elongated, the cotyledons very short.

A shrub or tree with opposite petioled leaves, large intrapetiolar acuminate stipules, and axillary, solitary peduncles, bearing geminate, secund spikes of sericeous or tomentose, rather small flowers.

Genus apparently near *Guettarda*, which it much resembles, but differing in the persistent calyx, the valvate conspicuously appendaged corolla-lobes and the dilated style.

I am indebted to Dr. Pax for kindly confirming my classification and diagnosis of this difficult genus.

Tournefortiopsis reticulata sp. nov.

A shrub or tree, the younger portions and lower leaf-surfaces tomentose; stipules 2 cm. long, about 6 mm. broad, oblong-ovate, acuminate, coriaceous, reddish-brown, almost keeled by the stout midrib; petioles 2–3 cm. long, mostly recurved-spreading, broadly channeled but closed in drying, conspicuously continuous with the stout, reddish midrib; blades 1–1.5 dm. long, 3–3.5 cm. broad, oblanceolate, blunt at the base, abruptly short-acuminate and cuspidate at the summit, coriaceous, glabrous and shining above, where the veins are strongly impressed, yellow-tomentose below, the 10–12 irregular pairs of prominent secondaries strongly up-curved and lightly connecting close to the margin, connected by the numerous straightish tertiaries; peduncles recurved, stoutish, dilated toward the bifurcation, mostly three-fourths the length of the petioles; spikes sessile, 3–4 cm. long, recurved, the flowers contiguous, erect; flowering calyx tomentose, about 3 mm. long, lobed nearly half-way, the lobes triangular-ovate; corolla tomentose, the tube 5 mm. long, the triangular-ovate lobes 2 mm. long and about as broad, each inflexed tip bearing two large, sub-rotund, fleshy appendages; filaments scarcely any, anthers more than 1 mm. long; fruit, exclusive of calyx, 5 mm. long, 4 mm. broad, sessile, oval-ovoid, ribbed, purple, the persistent calyx 3–4 mm. long, lobed more than half-

way, the cup-shaped tube nearly 3 mm. broad, the lobes broadly triangular-ovate, obtuse, coriaceous; stone brown with a purple summit, ribbed. (*No. 2230.*)

Chiococca alba (L.). (*Lonicera alba* L. Sp. Pl. 175. *Chiococca racemosa* L. Syst. ed. 10. 917.) "A tree 15 ft. high, growing in wet forest-land, the flowers yellow." Coripata, April 20, 1894. (*No. 2146.*)

FARAMEA SALICIFOLIA Presl, Symb. Bot. 24. *pl. 70.* (*No. 2655.*)

Faramea maynensis Spruce, in B. & H. f. Gen. 2: 121. Name only.

Glabrous; stems slender, herbaceous, angled in drying, the internodes 1 dm. long, dilated upward; stipules nearly 1 cm. long, connate two-thirds of their length, keeled toward the top, the keel continued into a terete awn; petioles 2.5 cm. long, rather narrow for the size of the leaf, channeled above, the channel continued into the midrib; blades 1.5–2.5 dm. long, 5–7 cm. broad, oblong, abruptly contracted into an acute base, and into a short attenuate acumination at the apex, thin, deep-green above, pale-green underneath, where the midrib and 14–16 pairs of principal, very slender secondaries are prominent, the latter connecting near the margins, coarsely and angularly reticulate between, with alternating, much more slender secondaries; peduncles (but one seen) 6 cm. long, blue-green, like the rachis and pedicels, the branches subtended by an irregular, cup-shaped involucre; branches of the involucre, like the pedicels, dilated upward, the latter about 7 or 8 mm. long; calyx-tube 1.5 mm. long, campanulate, strongly nerved, the limb lighter-colored, 1.5 mm. broad, shallowly lobed, the lobes acute; corolla-tube 7–8 mm. long, infundibular-cylindraceous, the limb in bud ovate, obtuse, 5 mm. long by 4 mm. broad, when expanded rotate and 1.5 cm. or more broad. (*No. 2016.*)

The same as *Spruce 4946*, etc. in Herb. Kew sub *F. salicifolia*.

FARAMEA MONTEVIDENSIS DC. Prodr. 4: 497. (*No. 2015.*) I think this is the same plant that Muell. Arg. has called *Rudgea micrantha* (Flora 59: 454).

PALICOUREA TRIPHYLLA DC. Prodr. 4: 526. (Specimen without number.)

Palicourea papyracea sp. nov.

Inflorescence puberulent, otherwise glabrous; branches stout, terete, dark-colored; stipules (those seen imperfect) connate for 2–3 mm., the free portions triangular-ovate; petioles 1.5 cm. long, broad, margined blades 2–3 dm. long, 0.8–1.5 cm. broad, the uppermost oblong, the lower broadly ovate, the upper gradually, the lower abruptly acuminate at the base, abruptly short-acuminate and

very acute at the apex, thin but rigid, dark-green, the slender venation sharply prominent on both sides, the 12 pairs of secondaries strongly ascending, the tertiaries meeting at an obtuse angle about midway between them; peduncle (but one seen) 8 cm. long, strongly angled, orange-colored like the general inflorescence; panicle 4 cm. long, 6 cm. broad, the pedicels erect, thickish, 3–4 mm. long; calyx campanulate, 2 mm. long and broad, the teeth very short and broad; corolla-tube 1.3 cm. long, stoutly infundibular, strongly oblique at the mouth and at the strongly gibbous base, the lobes 3–4 mm. long, spreading; style slender, exserted 5 mm., the lobes slender, twisted. (*No. 2014*, in part.)

Palicourea attenuata sp. nov.

Glabrous or the younger portions sparsely and minutely puberulent; branches very stout, angled above; stipules 4–5 mm. long and broad, triangular, obtuse; petioles 5 mm. long, consisting of the narrowed leaf-bases, broad, carinate underneath; blades 1–3 dm. long, 3–7 cm. broad, oblanceolate, acuminate at the base, attenuate at the apex, entire, rigid, thickish, deep-green above, light-green underneath; venation, except the very prominent terete midrib, inconspicuous above, prominent underneath, the 20 pairs of slender secondaries lightly upcurved, connected near the margin, and coarsely reticulate between by the slender and crooked tertiaries; peduncle very stout, 5–8 cm. long, the panicle pyramidal, obtuse, 1–1.5 dm. long, 7–9 cm. broad, moderately dense, the branches spreading, but not at a right-angle, slightly dilated at the insertion, strongly angled, subtended by lance-linear bracts, the largest 7–8 mm. long; pedicels proper none; flowers subulate-bracted, the bracts 1.5 mm. long; calyx campanulate, 1.5 mm. long, 1 mm. broad, the teeth minute, ovate, acute; corolla 5 mm. long, light-orange, nerved, the lobes 1 mm. long, ovate; fruit 4 mm. long, 5 mm. broad, green, lightly nerved, reticulate. (*No. 2017.*)

? Psychotria subcrocea Muell.-Arg.; Mart. Fl. Bras. 6^5: 244. (*No. 2861.*)

? Psychotria racemosa (Aubl.) Willd. Sp. Pl. 1: 966. (*Nonatelia racemosa* Aubl. Pl. Gui. : 186, *pl.* 72.) The simple inflorescence figured by Aublet may be due to poor development. (*No. 2656.*) The same as *Rusby 1867*.

Psychotria ovalifolia sp. nov.

Glabrous except for a yellow-gray, short, rather coarse pubescence on the principal veins of the lower leaf-surfaces, the corolla, calyx-lobes and young pedicels; branches dark-colored, terete or lightly angled, stoutish; stipules nearly 1 cm. long, 5 mm. broad, oval or obovate, rounded at the apex, minutely denticulate; petioles 2–2.5 cm. long (only the upper seen), stout, dark-colored, like the midribs; blades 2 dm. long, 1 dm. broad, oval, abruptly very short-

pointed at both ends, entire, bright-green, thin, 18–20 pairs of slender secondaries moderately upcurved, regularly connected by straight secondaries; peduncles 5 cm. long, lightly angled, the rachis more so; panicle (but one seen) about 1.2 dm. long, 8 cm. broad, obviously immature, regularly pyramidal, rounded at the apex, lax, the branches at right angles, dilated at the junction with the rachis, minutely subulate-bracted; pedicels 5 mm. long, slender; calyx-tube blackish, 3 mm. long, 2 mm. broad, cylindrical-campanulate, the limb abruptly spreading, the lobes about 1 mm. long and broad, triangular, obtuse; corolla 1 cm. long, densely tomentose, lightly contracted near the base, then regularly infundibular, the lobes 2 mm. long, triangular; stigmas exserted 2 mm., flattened, large. (*No. 2014*, in part.)

Apparently the same collected by *Spruce* near San Gabriel on the Rio Negro.

MAPOUREA TRISTIS Muell.-Arg. Flora 9^5: 458, 465. 1876. "A shrub 6 to 10 ft. high, growing in wet mould, in forest." Uchimachi, Coroico, August 12, 1894. (*No. 2378.*)

Cephaelis conephoroides sp. nov.

Glabrous; branches elongated, stoutish but weak, flexuous, blackish; stipules 5–8 mm. long and as broad or broader, ovate, abruptly short-acuminate and very acute, thick, rigid, appressed; petioles blackish, about 5 mm. long, very stout, consisting of the narrowed leaf-base; blades 1–1.5 dm. long, 3–5.5 cm. broad, oblanceolate, acute at the base, abruptly contracted into a short attenuate point, entire, dark-green and slightly shining, thick, the midrib lightly channeled above, underneath prominent, nerved, thinly margined, the secondaries very numerous, at a right-angle with the midrib, lightly up-curved, obscure above, prominent underneath; peduncles 4–8 cm. long, mostly thickened toward the summit, the black branches umbellate or fascicled, subtended by ovate, acute, spreading bracts about 5 mm. long, regularly thickened from the base upward, 2–3 cm. long, sharply quadrangular, the sides 1-nerved; flowers ternate, sessile; calyx hemispherical-turbinate, the limb short, erect, shortly sinuately 5-lobed, minutely fimbriate or ciliate; corolla-tube cylindraceous, slightly dilated at about the middle, sub-contracted at the mouth, thick and tough, the lobes valvate in the bud with the apices incurved, recurved in anthesis; stamens inserted a little below the middle of the tube, the filaments very short, naked except at the very base; the anthers linear, blunt at both ends, naked; style capillary, exserted, the branches linear, slightly flattened, thick, blunt, recurved; seeds one in each cell, erect, obovate, flattened, truncate, short, smooth and shining. (*No. 2866.*)

The same as *no. 366*, and *Rusby 2559*, both published as "*Coussarea?*" Also collected by *Pearce* at Moro, 3,000–4,000 ft., July,

1866, and apparently the same as *Fendler 1990*, from Tovar. The last named has fruit 1.5 cm. long by 1 cm. broad (exclusive of the tubular calyx-limb), oval to slightly ovate, each half broadly and strongly 4-grooved, blackish-red, finely granular.

POEDERIOPSIS gen. nov. *Poederiearum*

Flowers perfect. Calyx-tube campanulate, the limb 5-lobed, persistent. Corolla infundibular, puberulent without, the limb and throat long-pilose within, 5-lobed, the lobes induplicate-valvate. Stamens 5, included, the short, slender filaments inserted near the base of the corolla, the very large anthers lanceolate, sagittate with blunt lobes, acute and mucronate, sub-versatilely attached near the sinus of the lobes. Ovary 2-celled, 2-ovuled, the ovules erect from the base, anatropous, flattened. Style short; stigmas nearly as long as the corolla, filiform, not twisted in the partly opened flower, not pilose. Stems slender, twining, the stipules broad, bifid or 2-toothed, recurved, persistent, the leaves membranaceous, cordate, long-petioled. Panicles axillary, ample, lax, the flowers cymosely disposed. Fruit not seen.

The genus is very near *Poederia*, but differs in the persistent, bifid stipules, the mucronate acute anthers, the basal attachment of the filaments and the apparently straight stigmas (though these may become twisted in anthesis.)

Poederiopsis diffusa (Britton). *Manettia* (?) *diffusa* Britton, Bull. Torrey Club **18**: 107.

Branchlets puberulent; stipules 3–4 mm. long and nearly as broad, purple, thickish, ovate; petioles 3–6 cm. long, slender, channeled above, costate, dilated at the base; blades 0.5–1 dm. or more long and two-thirds as broad, ovate, shallowly cordate, acuminate and acute, entire, deep-green both sides, glabrous, thin, the midrib and 6 or 7 pairs of secondaries rather prominent underneath, the venation broad, dark, finely reticulate; peduncles of the panicles 2–6 cm. long, very slender; bracts ovate, acuminate, sub-scarious, pubescent; pedicels 1 mm. long, stout, canescent; calyx-tube 1.5 mm. long and broad, the lobes 1 mm. long, ovate, acutish, purple, thickish, the sinuses acute; corolla thick, deep-purple, obovoid in the bud (expanded corollas not seen), 6 mm. long, ovate; anthers 3 mm. long, 1 mm. broad; stigmas 5 mm. long, flattened at the end. (*No. 2216.*) The same as *Rusby 2121*, the type of *Manettia diffusa*.

Spermacoce corymbosa R. & P. Fl. Per. **1**: 60. (Specimen without number.)

? Spermacoce ocymoides Burm. f. Fl. Ind. 34. (Specimen without number.) The same as *Mandon 336*.

Spermacoce cephalophora sp. nov.

Glabrous or the leaves sparsely and minutely scabrous underneath; diffusely branched from the base, the branches slender, 1–2 dm. long, lightly 2- or 4-winged; united portions of stipules and rigid laciniae each about 2 mm. long; leaves sessile, 0.5–2 cm. long, 2–5 mm. broad, lanceolate, obtusish, entire; heads 0.5–1 cm. broad, dense; calyx-tube 2 mm. long, campanulate with the mouth slightly contracted; principal teeth 1 mm. long, subulate, pungent; corolla-tube 1.5 mm. long, stoutly infundibular-cylindraceous, the lobes 1 mm. long, ovate, obtuse; filaments a little exceeding the tube, the anthers oblong, half the length of the lobes; capsule dehiscing vertically from the top; seed brown, shining, a little more than 1 mm. long, elliptical. (*No. 2862.*)

MITRACARPUM HIRTUM DC. Prodr. **4**: 572. (*No. 2865.*) The same as *Mandon 340*. This is probably one of a number of distinct species at present included under this name.

RICHARDIA SCABRA L. Sp. Pl. 330. (*No. 1794.*) The same as *Rusby 1969*.

RELBUNIUM HIRSUTUM (R. & P.) Schum.; Mart. Fl. Bras. 6^6: 116. (*Galium hirsutum* R. & P. Fl. Per. **1**: 59.) (*No. 2864.*)

? RELBUNIUM MICROPHYLLUM (A. Gray) Hemsley, Biol. Cent. Am. Bot. **2**: 63. (*Galium microphyllum* A. Gray, Pl. Wright. **2**: 80.) (*Nos. 2019* and *2020.*) This is the same as *Bang 35*, which is not the same as *Rusby 1842*, although I have so published it.

Relbunium Bangii sp. nov.

Stems much elongated and very slender, strongly 4-angled, the angles bright-green, obtusish, sparsely armed with small white recurved prickles, the internodes about 1.5–2.5 cm. long; leaves in fours, sessile, 0.5–1.5 cm. long, 4–8 mm. broad, elliptical or slightly broader above, lightly mucronate, 3-nerved, the midrib stronger than the lateral nerves, sparsely, sharply hispid above, hairy-hispid on the nerves underneath; pedicels at length nearly 1 cm. long, filiform, spreading, angled; sepals foliaceous, 2.5 or becoming 4 mm. long, similar to the leaves but rather more pointed; berry drying blackish, 2 mm. long, 3 mm. broad, when young minutely sparsely hispid.

"Sometimes climbing; abundant in good forest soil; the flowers green, the fruits of a beautiful red, not like *nos. 269* and *518*, which have the fruits quite white." Coripata, Yungas, April 25, 1894. (*No. 2154.*) Apparently the same as *Rusby 1830*.

VALERIANACEAE

VALERIANA MANDONI Britton, Bull. Torrey Club **18**: 264. 1891. (*Nos. 1924* and *2021*.) The same as *Rusby 874*.

VALERIANA BANGIANA Graebn. Bot. Jahrb. **37**: 437. "A few feet high, growing in hedges along roadside; flowers greenish-white." Coripata, Yungas, September 6, 1894. (*No. 2415*.)

VALERIANA POLEMONIOIDES H.B.K. Nov. Gen. **3**: 332. (*No. 1824*.) The same as *Rusby 880*.

VALERIANA POTERIOIDES Graebn. Bot. Jahrb. **37**: 441. (*No. 1841*.)

VALERIANA PAVONII Poepp. Nov. Gen. et Sp. **3**: 16. *pl. 215*. "Climbing 8 to 12 ft. high, in rich mould, along forest-roads; flowers white." Coroico, July 25, 1894. (*No. 2362*.) This is the same as *Mandon 304*, *Spruce 4356* and *5077* and *Mathew's* specimens from Chachapoya, but is not *Jameson's* from Cuenca.

VALERIANA sp., near *V. Pavonii*. (*No. 1930*.)

VALERIANA, specimens indeterminable. (*No. 1947*.)

CALYCERACEAE

ACICARPHA PROCUMBENS Less. Linnaea **6**: 527. 1831. (*No. 1789*.)

COMPOSITAE

VERNONIA APICULATA Mart.; DC. Prodr. **5**: 51. "In dry, clayey soil, in grassy places, the flowers light-violet; scarce." Coripata, April 27, 1894. (*No. 2166*.)

VERNONIA BAKERIANA Britton, Bull. Torrey Club **18**: 331. 1891. "A shrub, 6 to 8 ft. high, in dry clay and gravel, the flowers pale blue; abundant." Coripata, May 12, 1894. (*No. 2189*.) The same as *Rusby 214*.

VERNONIA BREVIPETIOLATA Sch.-Bip.; Baker, in Mart. Fl. Bras. **6**^{2}: 85. "Two to four feet high, in dry clay, on hillsides, the flowers dark blue; abundant." Coripata, April 4, 1894. (*Nos. 2118* and *2886*.)

VERNONIA CORIACEA Less. Linnaea **6**: 661. 1831. (*No. 1888*.)

VERNONIA POLYCEPHALA DC. Prodr. **5**: 39. "A shrub, 5 to 8 ft. high, with light-red flowers, growing in sunshine, in dry clay and gravel; scarce." Coroico, September 8, 1894. (*No. 2420*.)

VERNONIA VARRONIFOLIA DC. Prodr. **5**: 56. (*No. 2218*.)

Vernonia patuliflora sp. nov.

(*Paniculatae*); stems, inflorescence and venation densely short-hairy, the hairs of the stem mostly a little reflexed; stems stout, purple or light gray-brown, the internodes mostly 4–8 cm. long; petioles 1–1.5 cm. long, very stout, strongly dilated at the base; blades 1–2 dm. long, 4–8 cm. broad, ovate, rounded at the base, shortly and acutely pointed at the apex, minutely and obsoletely serrate, above deep-green, rugose with impressed venation, minutely strigose, underneath pubescent, the regular, slender venation very prominent, the secondaries about 12–15 pairs, lightly ascending; panicles peduncled, very loose, 2 dm. long and broad, the slender branches horizontal and partly drooping; heads about 1 cm apart, 7 mm. long, the purple involucre 5 mm. long, broadly campanulate, the outer scales narrowly lance-linear, attenuate and pungent, the innermost about a half longer, oblong, acutish; akenes 1.5 mm. long, stout; inner pappus nearly 4 mm. long, fine, copious, the outer about the length of the akene.

"A slender shrub, 6–10 ft. high, with blue flowers, growing in sand and gravel near the river. Rather scarce." Coroico, August 23, 1894. (*No. 2396.*)

Vernonia paucisquamata sp. nov.

(*Paniculatae*); younger portions minutely puberulent; stem much elongated, very slender, apparently reclining, flexuous, finely angled; petioles 1–1.5 cm. long, thin, lightly margined above; blades 5–10 cm. long, 2–4 cm. broad, ovate, rounded at the base, abruptly acuminate and acute at the apex, entire, deep-green, the venation not prominent, reticulate, the secondaries 4 or 5 pairs; panicles axillary, strongly peduncled, the flowering portion 5–6 cm. long, 3 cm. broad, lax, leafy-bracted; heads sessile; involucres campanulate, 5 mm. long, the scales few, in about 4 series, appressed, oval to oblong-linear, obtuse, the middle green, the outer successively shorter; corollas not seen; akenes 2 mm. long, lightly but sharply angled, the pappus white, 4 mm. long, rigid, copious, connate by a narrow, dark basal ring.

"Climbing 8 to 15 ft. high, in wet forest-mould." Coroico, September 4, 1894. (*No. 2409.*) The same as *Rusby 1729.*

Vernonia deflexa sp. nov.

Coarsely hirsute, including the involucres and the principal veins; root stout, long and coarsely branched; stems erect or ascending, rather slender, 5 dm. or more high, branched at the summit; lower leaves very short-petioled, the upper sessile, the narrow base becoming deflexed, the blade horizontal, 0.5–1.2 dm. long, 0.75–1.5 cm. broad, oblong, acute at both ends, obsoletely serrate, ciliate, rather thin, pale-green, the venation prominent, very strongly so underneath, the 10–12 irregular pairs of crooked secondaries strongly

ascending, connecting at some distance from the margin; heads loosely disposed, solitary in the axils, the lower slenderly and shortly peduncled; involucre broadly campanulate, 6–8 mm. long, the scales in many series, narrowly linear-attenuate, the innermost successively longer; akene 1.5 mm. long, oblanceolate; outer pappus dense, 1 mm. long, the inner rather scanty and coarse, 6 mm. long; corolla-tube narrowly cylindrical or sub-filiform, 4 mm. long, the limb abrupt, the lobes 3 mm. long, bright-purple, oblanceolate, thin. (*No. 2038.*)

VERNONIA sp. The inflorescence is too far advanced to permit of a diagnosis. (*No. 2043.*)

AGERATUM CONYZOIDES L. Sp. Pl. 1175. (*No. 2027.*)

STEVIA URTICIFOLIA Thunb. Pl. Bras. Dec. 1: 13. (*No. 2877.*)

Stevia Bridgesii sp. nov.

Roughly strigose-pubescent throughout; stems terete, green or light-purplish above, erect or ascending, much-branched and very leafy, the branches very slender, erect or strongly ascending; leaves 1–3 cm. long, 4–8 mm. broad, the smallest narrowly oblong, the largest ovate, the narrowed base somewhat clasping, or closely sessile, obtuse, mostly entire, the largest coarsely serrate, thickish, slightly 3-nerved, the midrib prominent below; fascicles of 3–5 heads, shortly racemed at the ends of the branchlets, leafy-bracted; peduncles of the heads scarcely any; heads about 1.2 cm. long; involucres infundibular, 8 mm. long, 3.5 mm. broad at the summit, purple, the scales oblong, acute, about 2 mm. broad; akenes very slender, 5 mm. long; pappus 5 mm. long; corolla-tube bright-purple, 6 mm. long, the lobes lighter, 2 mm. long, oval-ovate. (*No. 2047.*)

The same collected by *Bridges*. Near *S. compacta* Benth., and near *Mandon 244*.

STEVIA sp. (*No. 2041* is apparently a *Stevia* with deformed inflorescence.)

EUPATORIUM AMYGDALINUM Lam. Encyc. 2: 408. "Grows in wet clay, in grassy places; scarce; flowers light-red." Coripata, June 24, 1894. (*No. 2291.*)

EUPATORIUM DENDROIDES Spreng. Syst. 3: 415. (= *Mikania arborea* H.B.K., but this is preceded by an *E. arboreum.*) "A shrub, 8–15 ft. high, in dry gravelly and clayey soil, the flowers white; abundant." Coripata, April 10, 1894. (*No. 2113.*)

EUPATORIUM GLOMERATUM DC. Prodr. 5: 154. "A shrub 5–8 ft. high, in dry places along roadsides, the flowers white and fragrant; abundant." Coripata, March 30, 1894. (*No. 2112.*)

EUPATORIUM MACROPHYLLUM L. Sp. Pl. ed. 2. 1175. "Growing

in wet clay, the flowers white." Coripata, May 10, 1894. (*No. 2042* and *2183*.)

EUPATORIUM MEGAPHYLLUM Baker, in Mart. Fl. Bras. 6^2: 322. "Plant 5–6 ft. high, growing near the river, in dry gravelly soil, the flowers white; not abundant." Coripata, June 20, 1894. (*No. 2298*.)

EUPATORIUM SCOPULORUM Wedd. Chlor. And. 1: 216. (*No. 1912*.) The same as *Mandon 263*.

EUPATORIUM SORDESCENS DC. Prodr. 5: 167. "A shrub from 10–20 ft. high, growing along roadsides and in hedges, the flowers bluish-white and pleasantly fragrant. The leaves and bark are very bitter and are used as a remedy against sand-fleas and lice on animals. Local name 'Tui.' Grows also at Sorata." Coroico, August 14, 1894. (*No. 2381*.) Apparently the same as *Glaziou 12848*.

EUPATORIUM STIPULIFERUM Rusby, Mem. Torrey Club 4^3: 210. (*No. 2876*.)

EUPATORIUM SUBSCANDENS Hieronymus, Bot. Jahrb. 21: 742. 1897. (*No. 2050 p.p.*) The same as *No. 1208*, distributed as ***E. conyzoides*** Vahl.

? EUPATORIUM VITALBAE DC. Prodr. 5: 163. "Climbing 8 or 10 ft. high, over shrubs, in dry clay and gravel, the flowers rose-colored." Coroico, August 20, 1894. (*No. 2389*.) This appears to be the same as *Glaziou 12062*.

EUPATORIUM HECATANTHUM (DC.) Baker, in Mart. Fl. Bras. 6^2: 365. (*No. 2114a*.) The same as *Rusby 2125*, published as *E. macrophyllum* L. (*fide* Hieronymus, Bot. Jahrb. 11: 789. 1897).

Eupatorium heptanthum Sch.-Bip. (Bonplandia 4: 54; name only. 1856.)

Minutely puberulent; stems thickish but weak, purple below, the internodes 5–6 cm. long; petioles 0.5–1 cm. long, stout; blades 1.5–4 cm. long, 1–3 cm. broad, ovate, strongly cordate, acute, crenate-dentate, bright-green, the venation rather prominent below, finely reticulate; corymbs leafy, loose, the branches slender; peduncles of the heads stout, very short; heads 5 mm. long and rather broader; involucres hemispherical, the inner scales 5 mm. long, lance-oblong, acute, strongly nerved, green; corolla 3.5 mm. long, infundibular, the lobes broadly ovate, spreading; pappus sparse, white or reddish; akenes blackish, 2 mm. long, oblanceolate, little tapering at the base. (*No. 2037*.)

The same as *Mandon 260*, and apparently collected by *Seemann* in Venezuela.

Eupatorium jugipaniculatum sp. nov.

Stems rather slender, striate, pubescent, the branches of the inflorescence slightly ferruginous; petioles 1 cm. long, pubescent like the midrib on both surfaces and the veins underneath; blades 8–15 cm. long, 3–6 cm. broad, oval to obovate, narrowed but mostly blunt at the base, abruptly short-pointed and obtuse at the apex, serrate with small, sharp, salient teeth, deep-green both surfaces, sparsely strigose; corymbs peduncled, nearly 1 dm. broad, of several regular pairs of rather distant branches which are leafy-bracted at the base, loose; peduncles of the heads 0.5–1 cm. long, slender and weak, filiform-bracted; heads at maturity nearly 1 cm. long and almost as broad; involucre turbinate-campanulate, nearly equaling the pappus, a few small scales at the base, the principal ones 5–6 mm. long, linear, attenuate from the base, strongly nerved, ferruginous-pilose; akenes 3–4 mm. long, oblong-oblanceolate with a narrow base, lightly curved, sharply 5-angled; pappus 4–5 mm. long, white or slightly tawny, serrate; corolla 4–5 mm. long, the tube cylindraceous, the lobes 1 mm. long; style-branches 4 mm. long, flattened, rounded at the apex.

"A shrub 6–8 ft. high, with white flowers, in wet forest-mould." Coroico, September, 1894. (*No. 2471.*)

Eupatorium triosteifolium sp. nov.

Finely tomentellate, except the sub-glabrous upper leaf-surfaces; stems stout, coarsely angled; upper leaves 1.5–3 dm. long, 4–10 cm. broad, ovate, abruptly contracted into a connate, petiole-like base more than half as long as the ovate portion, acute at the apex, coarsely and sharply serrate, thin and fragile, dark-green above, pale or grayish underneath, the midrib and 6 or 7 pairs of secondaries prominent underneath, broad and flat; corymbs terminal and lateral, the latter on long, widely spreading peduncles, about 1 dm. broad, rather dense, compound and leafy; peduncles of the heads 1–1.5 cm. long, slightly thickened upward; heads nearly 1 cm. long, nearly as broad; involucre campanulate, the scales oblong to oblong-linear, obtuse, the outer successively shorter, green, nerved, the innermost exceeding the pappus, white, the green nerves very strong; flowers numerous, yellowish-white; akene 2 mm. long, linear-oblong, truncate, blackish, strongly 5-angled, lightly curved; pappus 4–5 mm. long, rather unequal, white, rather scanty, short-barbellate; corolla infundibular, the lobes less than 1 mm. long, acute, pilose toward the summit; filaments inserted about the middle of the tube, the anther-appendages short, blunt, inflexed; receptacle plane or slightly concave, tuberculate; style-branches flattened, sub-truncate, papillose.

"A slender shrub, 10 to 12 ft. high, with white flowers; scarce in gravel and mould near the river." Coroico, August 14, 1894. (*No. 2380.*)

Eupatorium latipaniculatum sp. nov.

Younger portions of stem, peduncles and midribs puberulent; branches elongated, very widely spreading; leaves 2 dm. or more long, 6–8 cm. broad, the bases long-acuminate and petiole-like, sub-confluent, apex acuminate, margin coarsely and sharply serrate, thin, deep-green, somewhat scurfy both sides; peduncles of the lower axillary corymbs 1.5 dm. long, the corymbs rather lax, 1 dm. broad; peduncles of the heads 0.5–1 cm. long, purplish, thickened at the summit; heads nearly 1 cm. long, and a half broader; involucre of about 20 scales, loose, the inner 3 mm. long, narrowly lanceolate, acute, purplish; corolla 4 mm. long, narrowly infundibular, purple; pappus equaling the corolla, white, fine, copious; akene oblanceolate, slender, nearly 2 mm. long, black, smooth, sharply angled.

"A slender shrub, 6 to 10 feet high, with rose-colored flowers, in rich shaded mould." Sacramento, Yungas, August 20, 1894. (*No. 2386.*) Species near *E. ianthinum.*

Eupatorium capitatum sp. nov.

Puberulent throughout; stems weak, much-branched, the branches widely spreading or drooping, apparently reclining, striate; petioles 1.5–4 cm. long, slender and weak, little dilated at the base; blades 3–7 cm. long, 1.5–3 cm. broad, ovate, mostly inequilateral, rounded or subcordate at the base, obtuse or acutish at the apex, coarsely serrate with short blunt teeth, deep-green above, grayish-green underneath, thin, trinerved, the venation coarse, reticulate, rather prominent underneath; heads few, very loosely corymbed, on peduncles 2–3 cm. long, 1 cm. long and a half broader; involucre of 20–25 scales, broad, loose, the scales 7 mm. long, oblong, deep-green, strongly 3-nerved, acute; corolla nearly 4 mm. long, narrowly infundibular, the margin much broader than the tube; style-branches exserted 2–3 mm.; pappus white, fine, copious, nearly equaling the corolla; akene 5 mm. long, tapering from the summit to an acute base, black, glabrous, strongly and sharply angled.

"A few feet high, the flowers light red; scarce, in dry gravelly soil." Coripata, Yungas, March 25, 1894. (*No. 2114.*)

Eupatorium gynoxioides sp. nov.

Very finely and closely puberulent; stems stout, purplish, the upper internodes about 3 cm. long; upper leaves only seen, their petioles 3 cm. long, purple, stout, narrowly margined and keeled; blades 1–1.5 dm. long, 4–6 cm. broad, ovate, abruptly acute at the base, shortly and bluntly acuminate at the apex, obsoletely and very

coarsely sinuately serrate, coriaceous, above deep-green or purplish, minutely strigose, underneath ferruginous, the venation lightly prominent both sides, the slender, crooked secondaries about 6 or 7 pairs; panicles corymbiform, 1 dm. or more broad, rather dense, the branches striate, the bracts linear-subulate, small; heads peduncled, the peduncles striate or angled, at length 1 cm. or more long; heads 8 mm. long and about as broad, the involucres campanulate; scales in about 3 series, closely appressed, the outer shorter, the inner 5 mm. long, thick, rigid, striate, oblong, obtuse, mostly purple-tipped; corollas 4–5 mm. long, cylindraceous, slightly dilated toward the summit, the lobes short, recurved; pappus sparse, white, about equaling the corolla; style-branches exserted nearly 4 mm., slightly thickened at the summit; akenes 2.5 mm. long, oblanceolate with tapering base, black, glabrous, strongly angled.

"A scarce tree, 15 to 20 ft. high, with light-red flowers, in wet forest-mould." Coripata, Yungas, May 16, 1894. (*No. 2194.*)

Ophryosporus piquerioides (DC.) Benth.; Mart. Fl. Bras. 6^2: 188. (*Eupatorium piquerioides* DC. Prodr. 5: 175.) "Climbing 6 ft. high, in sunny places, in clay and mould; abundant; flowers white." Calapampa, Coroico, July 14, 1894. (*No. 2342.*) Distributed as "*Mikania* sp. nov."

Willoughbya cordifolia (L. f.) Kuntze, Rev. Gen. Pl. 372. (*Cacalia cordifolia* L. f. Suppl. 357.) (*Nos. 2880* and *2881.*)

Willoughbya hirsutissima (DC.) Kuntze, Rev. Gen. Pl. 372. (*Mikania hirsutissima* DC. Prodr. 5: 200.) "In rich mould, forest shade, climbing 10 to 12 feet, the flowers greenish-white, abundant." Calapampa, July 5, 1894. (*No. 2326.*) The same as *Blanchet 3692.*

Willoughbya lanuginosa (DC.) Kuntze, Rev. Gen. Pl. 372. (Specimen without number.) The same as *Gardner 5779.*

Willoughbya odorata (Lehm.) Kuntze, Rev. Gen. Pl. 372. (*Mikania odorata* Lehm. Hamb. Gartenz. 5: 369. 1847.) "In rich forest-mould, near river, climbing 6 to 10 ft. high, the flowers white; abundant." Calapampa, July 12, 1894. (*No. 2339.*) The same collected by *Mathews* at Chachapoya.

Willoughbya psilostachya (DC.) Kuntze, Rev. Gen. Pl. 372. "Growing in wet sand and climbing 10 to 20 ft. high, the flowers white; scarce." Coripata, April 20, 1894. (*No. 2148.*)

Willoughbya scandens (L.) Kuntze, Rev. Gen. Pl. 371. (*Eupatorium scandens* L. Sp. Pl. 836.) (*No. 2882.*)

Willoughbya trinervis (H. & A.). *Mikania trinervis* H. & A. Hook. Comp. Bot. Mag. 1: 244. 1835. (*No. 2884.*)

Willoughbya trifolia sp. nov.

Branchlets, lower leaf-surfaces and peduncles minutely puberulent; branchlets short, stout, strongly spreading or divaricate, angled, the leaves opposite (or in threes in Mandon's specimens); petioles 2–3 cm. long, stoutish; blades ternate or quinate, the divisions 1–3 cm. long, 0.5–1.5 cm. broad, obovate with cuneate base, blunt, coarsely (mostly 1- to 3-) lobed, thin, dark-green, the principal veins lightly prominent on both sides; corymbs mostly 3–6 cm. broad, dense; peduncles of the heads 2–4 mm. long; involucral scales 5 mm. long, 2 mm. broad, oblong, abruptly and acutely pointed, tricostate; akene dark-brown to black, nearly 3 mm. long, strongly angled; pappus 4 mm. long, copious, rigid, rather coarse; corolla-tube slender, 2.5 mm. long, the lobes spreading, 1.5 mm. long, oblong; style-branches filiform, spreading widely, 3 mm. long.

"A low climber, with white flowers, in wet forest-mould, scarce." Coroico, September 10, 1894. (*No. 2426.*) The same as *Mandon 266*, which Schultz-Bipontinus has called, without description, *Mikania trifolia* (Linnaea **34**: 535. 1865–66).

Willoughbya longiflora sp. nov.

Ferruginous-tomentose; stems and branches stout; petioles 4–8 cm. long, very stout; blades 1–1.5 dm. long, two-thirds as broad, ovate, deeply cordate, acute, thin, dark-green and slightly scabrous above, ferruginous-tomentose underneath, 3- or 5-costate, the principal veins very strong and prominent underneath; peduncles much elongated, angled; corymbs 1–1.5 dm. broad, lax and open; peduncles of the heads scarcely any; scales of the involucre 6–7 mm. long, oblong, acute, 1- to 3-costate, green with scarious margins; akenes 2 mm. long, strongly angled; pappus 6 mm. long, copious, coarse, white; corolla about the length of the pappus, the lobes 2 mm. long; anthers very thick and prominent; style-branches 3 mm. long.

"Climbing 8 to 10 ft. in forest shade, the flowers greenish-white; scarce." Calapampa, near Coroico, July 5, 1894. (*No. 2325.*) Also *no. 2297*.

Willoughbya leucophylla sp. nov.

Glabrous except for the finely white-scurfy veinlets underneath; branchlets stoutish, finely and regularly costate, pale; stipules rhomboidally ovate, recurved into a pouch-like form, the pouch ovoid, 1 cm. long, 5 mm. broad, coriaceous, brown with numerous light ribs or striae; petioles 2–4 cm. long, slender; blades 0.6–1.2 dm. long, 3–6 cm. broad, ovate, strongly cordate, abruptly and slenderly acuminate but scarcely acute, the margin obscurely sinuate, coriaceous, dark-green above, whitish underneath, 5-ribbed, the principal branches meeting at some distance from the margin,

the veinlets finely and conspicuously reticulate; peduncles stout; corymbs 0.6–1.2 dm. broad, open, the branchlets densely flowered, bracted with lanceolate or linear bracts; peduncles of the heads 5–8 mm. long, slender; scales of the involucre 8 mm. long, 3 mm. broad, oblanceolate, obtuse, faintly striate, the margins scarious; akenes 5 mm. long; pappus 7 mm. long, copious; corolla stoutly infundibular, a little longer than the akene, the lobes short, broadly ovate; anthers exserted 3 mm.; style-branches 4 mm. long, twisted. (*No. 2241.*)

Willoughbya Hieronymi sp. nov.

Tomentose and slightly ferruginous; stems and branchlets very stout, purple; petioles 3–4 cm. long, very stout, the upper half broadly winged by the decurrent blade; blades 1 dm. or more long and broad, triangular-ovate, cordate, the base decurrent, abruptly very short-pointed, membranaceous but thickish, dark-green and scabrous above, yellowish-gray-tomentose underneath, 3- or 5-costate, the lateral ribs originating near the base of the midrib, finely reticulate; corymbs of very irregular size, dense, very stoutly peduncled; heads sessile in threes; involucral scales 6 mm. long, oblanceolate, rounded at the apex, dark purple-green; akene 2 mm. long; pappus 7 mm. long, copious, coarse, dark-brown; corolla-tube 3.5 mm. long, the lobes (greenish) 2.5 mm. long, ovate, obtuse; style-branches 1.5 mm. long.

"Prostrate in wet, clayey soil, the flowers bluish-green; scarce." Coripata, Yungas, April 28, 1894. (*No. 2169.*)

Solidago polyglossa DC. Prodr. 5: 332. (*Nos. 2049* and *2980.*) "A few feet high, growing in yellow clay, coca plantations and other cultivated places, the flowers yellow." Near Coripata, March 15, 1894.

Diplostephium Mandoni sp. nov.

Shrubby, the branchlets crowded, stout but weak, ascending, very leafy; leaves sessile by a narrowed, petiole-like base, 3–5 cm. long, 6–12 mm. broad, smaller toward the base and summit of the branchlet, lanceolate, obtusish or barely acute, coriaceous, deep-green and glabrous above, with the venation deeply impressed, thickly yellow-tomentose with the venation concealed underneath; heads subsessile among the crowded terminal leaves; involucre 1 cm. long, broadly campanulate, many-serialled, the scales lanceolate, acuminate, very thick, strongly recurved, purple, gray-pilose, the inner linear, the outer successively shorter, the outermostl anceolate; akenes uniform, 1 mm. long, turbinate-obovoid; pappus similar in both flowers, 5–6 mm. long, flexuous, purple, the outer very short indeed, scarcely perceptible; corolla nearly 1.5 cm. long, 2 mm. broad, the apex narrowed abruptly, slightly 3-toothed; exserted portion of style 3 mm. long, its branches 1.5 mm. long; disk-corollas purple, the

lower cylindraceous portion nearly 2 mm. long, the upper broadly infundibular portion 3 mm. long, the lobes 1 mm. long and broad, ovate-obtuse; style-branches 1.5 mm. long; anthers nearly 2 mm. long. (*No. 2895.*)

The same as *Mandon 219.*

Diplostephium liabioides sp. nov.

Closely short ferruginous-tomentose, the upper leaf-surfaces becoming glabrous; branches stoutish but weak, erect or ascending, purple, terete, densely leafy; leaves sessile by a narrowed, petiole-like base, 3–6 cm. long, 0.5–1.5 cm. broad, oblong, obtusish, but minutely apiculate, sharply and rather coarsely and distantly serrate, thick, bright-green above, with the midrib impressed, deep-purple underneath, the midrib very prominent, the venation slender, reticulate; corymb small, dense, leafy at the base; peduncles of the heads short and stout; involucre hemispherical-campanulate, about 9 mm. long, the outer scales successively shorter, the two outermost series abruptly shorter, broader, ovate, green, the others lanceolate, purple, all rigid and acute; receptacle plane, foveolate; akenes similar in both flowers, short-obovoid, obscurely angled; pappus of the ray-flowers 6 mm. long, of the disk-flowers 4–5 mm. long, purple, coarse, short-barbellate; rays white, the limb about 1 cm. long, linear-oblanceolate, emarginate; style-branches recurved; short-lanceolate ,flattened, obtuse, hirtellate toward the summit; disk-corollas purple, 5 mm. long, broadly infundibular, the lobes 1 mm. long, ovate; anthers nearly 3 mm. long, the appendages short, obtusish; style-branches 2 mm. long, flattened, acutish, the upper half long-pilose.

"A low shrub with blue flowers, in forest-mould." Unduavi, September, 1894. (*No. 2496.*)

Diplostephium atropurpureum sp. nov.

Shrubby; branchlets, lower leaf-surfaces, etc., densely and closely yellow-tomentose, the lower leaf-surfaces sparingly and the involucre more abundantly gray-scurfy also; branchlets leafy, angled; leaves 2.5–6 cm. long, 0.5–1 cm. broad, lance-oblong, tapering into a petiole-like base, obtuse, appearing acute by the revolute margins, entire, very thick, glabrous and finely wrinkled in drying above, with the midrib and primaries sharply impressed, the midrib very stout and prominent underneath, with the venation obscure; inflorescence terminal, loosely corymbose; peduncles of the heads 1–2 cm. long, very stout, terete, with one to several small leafy bracts; involucre campanulate, squarrose, the obtuse scales thick and coriaceous, deep-purple, 1-nerved, the outermost short-ovate, the inner successively longer, the innermost 1 cm. or more long, linear; receptacle convex, foveolate, chaffy in the center, the scales narrow and fimbrillate; akenes uniform, 1.5 mm. long, 1 mm. broad, obovoid, hispid, slightly compressed, ob

scurely angled; pappus of both flowers alike, 7–8 mm. long, purple, barbellate, the outer very short; rays nearly 2 cm. long, 1.5 mm. wide, slightly 3-toothed, white; style red, thickish, exserted about 5 mm., the branches 1.5 mm. long, linear, lightly flattened, slightly narrowed toward the apex; disk-corollas whitish toward the base, bright-purple above, pubescent, the lower narrow-cylindrical portion 2 mm. long, the remainder 5 mm. long, about twice as broad as the lower part, infundibular, the strongly recurved lobes 1 mm. long, thickish, acutish; anthers 3 mm. long, the yellow apical appendages nearly 1 mm. long, narrow, obtuse; style-branches about 1 mm. long, subulate, flattened, pilose. (*No. 2030.*)

Differs from *D. Mandoni* in the longer tomentum, midrib prominent underneath, narrower involucre-scales, shorter rays, shorter and broader disk-corollas with broader lobes, and shorter styles. *Mandon 215* and *Pearce's* specimen from Munya, May, 1863, are very similar externally, and may be the same.

ERIGERON HIERACIOIDES Wedd. Chlor. And. 1: 194. (*No. 1865.*) The same as *no. 1219.*

ERIGERON PAZENSIS Sch.-Bip.; Rusby, Mem. Torrey Club 3: 54. (*No. 2874, pp.*) The same as *nos. 14* and *67.*

? ERIGERON CANESCENS Sch.-Bip.; Linnaea 34: 534. 1865–66. (Specimen without number.)

CONYZA ANDICOLA Philippi, Verzeichn. Pfl. Antofagasta und Tarapaca 38. (*No. 1973.*)

Conyza lignescens sp. nov.

Minutely puberulent; stems woody and branched at the base, 3–5 dm. long, the branches erect, stout, angled; leaves 4–8 cm. long, 0.7–2 cm. broad, oblanceolate, tapering into a winged petiole which is attached by a dilated base, blunt at the apex, finely and rather obtusely serrate, thickish but flaccid, drying yellowish, strongly 3-nerved, coarsely reticulate; corymbs terminal, 2–8 cm. broad, rather dense; peduncles of the heads 0.5–1 cm. long, thickened at the summit, striate; heads 7 mm. long and broad; involucre 4 mm. long, hemispherical-campanulate, the scales about 2-serialled, ovate, obtusish, purple with scarious margins; pappus tawny, very fine; corolla of the pistillate flowers 1.5 mm. long, the style as much longer, the pappus about as long as the style, the akene 0.5 mm. long; corolla of the perfect flowers 2 mm. long, nearly equaling the style. (*No. 2873.*)

Conyza evacioides sp. nov.

Densely white-floccose, the hairs long and tough; root finely branched; stems numerous from a stout crown, ascending, 1–2 dm. long, mostly simple, densely leafy, the leaves erect, sessile, oblan-

ceolate, 1–2 cm. long, 4–5 mm. broad, thickish, narrowed and sub-entire toward the base, above pinnatifid-toothed or lobed, the lobes 2 or 3 pairs, ovate, slightly falcate, obtusish or acute; heads several, at and near the summit, partly concealed among the upper leaves, appearing sessile but short-peduncled; involucre hemispherical, the scales several-serialled, lanceolate, acute, green below, scarious and purple above with darker middle portion; akenes 0.5 mm. long, oval; pappus 3.5 mm. long, plumose; pistillate corollas 2 mm. long, the others 1.5 mm. long, broadly infundibular, lobed half-way; style-branches short, thickish, the appendages triangular, pubescent. (*No. 1875.*)

Baccharis caespitosa (R. & P.) Pers. Syn. 1: 425. (*Molina caespitosa* R. &. P. Syst. Veg. 203.) (*No. 1834.*)

Baccharis dracunculifolia DC. Prodr. 5: 421. "A shrub 6 to 10 ft. high, growing in dry gravel and clay, with white flowers; abundant." Coripata, May 15, 1894. (*No. 2193.* Also *no. 2890 ?*)

Baccharis mapirensis Rusby, Mem. Torrey Club 6: 61. (*No. 2288*, which is the same as as *no. 1481*. *No. 2452* has oblong, blunt leaves, but *Rusby 1575* has some of the leaves similar, while others are like the type, and it seems to connect the two forms.) Of *no. 2452* Mr. Bang says: "A shrub, 6 to 8 ft. high, with white flowers, growing in forest-mould near the river." Coroico, September, 1894.

Baccharis floribunda H.B.K. Nov. Gen. 4: 64. (*No. 2885.*) The same as *Rusby 1583*.

Baccharis microphylla pulverulenta Rusby, Mem. Torrey Club 3[3]: 56. (*No. 2891.*) The same as *no. 74*.

Baccharis trinervis (Lam.) Pers. Syn. 2: 423. (*Conyza trinervis* Lam. Encyc. 2: 85.) (*No. 2892.*) The same as *no. 512*.

Baccharis scandens (R. & P.) Pers. Syn. 2: 424. (*No. 1925.*)

Baccharis syncephala Sch.-Bip. (Bonplandia 4: 54; name only. 1856.)

Lower leaf-surfaces, peduncles, involucres, etc., minutely granular; branches very stout, strongly costate or angled, blackish, densely leafy; petioles 1 cm. or more long, consisting of the narrowed leaf-bases, attached by a base 3–4 mm. broad; blades 5–7 cm. long, 1.5–3 cm. broad, oblong, abruptly narrowed into a broadly winged petiole, obtuse, coarsely serrate, the teeth about 3 pairs, short, broad, rounded; blades thick and coriaceous, pale-green, the midrib strong, winged by the decurrent secondaries, of which there are about 7 pairs of principal, alternating with about three times as many

lesser ones, slender, strongly ascending, connecting near the margin; panicle sessile, 5–7 cm. long, 7–9 cm. broad, very dense; heads subsessile; involucres 5 mm. long and broad, turbinate, the scales in numerous series, green with brown tips, oblong or ovate, rounded at the apex, thick and rigid; only hermaphrodite flowers seen, the akenes present but short; pappus scanty, crooked, rough, 3 mm. long; corollas 3–4 mm. long, the lobes 1 mm. long, strongly recurved; anthers 1 mm. long, exserted, the thickish style-branches projecting nearly 1 mm. (*No. 2261.*)

Baccharis saliens sp. nov.

Coarsely ferruginous-tomentose, except the upper leaf-surfaces; branches very stout, erect or strongly ascending, striate; petioles 0.5–1 cm. long, stout, narrowly channeled above; blades 3.5–5 cm. long, 1.5–2.5 cm. broad, ovate, rounded at the base, abruptly short-pointed and acutish or obtusish at the apex, finely and very sharply and slenderly dentate, the teeth at length divergent; thick and rigid, deep-green, 3-nerved by the lowest pair of secondaries, which connect with the second pair a little above the middle of the leaf and about one-third of the way from the margin to the midrib, finely and strongly reticulate, glabrous above with the principal veins plane or lightly impressed, ferruginous underneath upon the veins which are very prominent; panicles or their principal branches 5–7 cm. long, 4–6 cm. broad, pyramidal, dense, the heads sessile; involucre 6 mm. long, broadly campanulate, the scales in about 6 series, ovate or lanceolate, acuminate and acute or attenuate, the inner successively longer, more slender and lighter; akenes 1 mm. long, dark-brown, rather stout; pappus copious, fine, white, 4 mm. long; corolla very slender, a little more than 2 mm. long, the lobes very short; pistil exserted nearly 2 mm., the lobes of the style dark, 0.5 mm. long, erect.

"Scarce in wet forest-mould; climbing; flowers white." Unduavi, September, 1894. (*No. 2493.*)

?Achyrocline alata DC. Prodr. 6: 221. (Specimen without number.) Apparently the same as *Mandon 158*, but the heads much smaller than in *Bridges'* specimen from Bolivia.

?Achyrocline celosioides (H.B.K.) DC. Prodr. 6: 221. (*Gnaphalium celosioides*, H.B.K. Nov. Gen. 4: 78. *pl. 329.*) (Specimen without number.) "Growing a few feet high, in very dry rock, the flowers white; scarce." Coripata, April 10, 1894. (*No. 2022.*)

Achyrocline rufescens DC. Prodr. 6: 220. (Specimen without number.) The same collected by *Pearce* in the Andes of Ecuador, 12,000–13,000 ft.

Achyrocline Vautheriana DC. Prodr. 6: 220. (*No. 2278.*) (The same as *Gardner 4261?*)

Achyrocline polycephala sp. nov.

Stems weak, much elongated, widely branched, densely and rather long yellowish-tomentose; leaves 5–9 cm. long, 1–3 cm. broad, oblong, sessile by a narrow base, acute, above deep-green, papillose, pubescent when young, underneath densely yellow-tomentose, the venation inconspicuous; flowers densely panicled in rather large glomerules; heads 3 mm. long, the scales oval, obtuse, hyaline, green at the base; scales less than 0.5 mm. long, oval; corolla 3.5 mm. long, narrowly cylindraceous, white, the lobes brown, spreading, about as long as the akene.

"In dry gravelly soil, climbing 5 or 6 feet, the flowers white." Coroico, July 11, 1894. (*No. 2336.*)

Species very near *A. deflexa.* Superficially much like the last, but the corollas quite distinct.

Achyrocline tomentosa sp. nov.

Stems rather stout, woody at the base, terete, striate, softly and closely gray-tomentose, much branched, the branches mostly erect or strongly ascending, flexuous, 2–3 cm. long; leaves 3–6 cm. long, 0.6–1.5 cm. broad, the floral smaller, the blade proper regularly and rather angularly lanceolate, tapering into a petiole-like base which is not, or little, dilated at the insertion, acute at the apex, bright-green but grayish-tomentose above, densely yellow-tomentose underneath, the midrib inclined to a purple color, rather prominent both sides, especially underneath, the venation obscure; panicles leafy, broad and open, mostly 6–8 cm. long and rather broader, the heads densely clustered at the ends of the branches, the ultimate clusters 4–5 mm. broad, yellow-tomentose at the base; head 3 mm. long, the scales broadly ovate, acute, hyaline; akene and corolla together less than 2 mm. long, the akene short, broad, dark-purple or blackish, one-half as long as the broadly cylindraceous corolla.

"A small plant, a few feet high, with white flowers; rather scarce in very dry soil on rocks." Coripata, April 10, 1894. (*No. 2124.*)

? Gnaphalium cheiranthifolium Lam. Encyc. 2: 752. (*Nos. 2011, 2041 p.p.* and *2633.*)

Gnaphalium cymatoides Kunze; DC. Prodr. 6: 225. (*No. 2040.*)

Gnaphalium spicatum Lam. Encyc. 2: 757. (*No. 2896.*)

Lucilia affinis Wedd. Chlor. And. 1: 230. (Specimen without number.) The same as *Mandon 168.*

? Lucilia squarrosa Baker, in Mart. Fl. Bras. 6[3]: 114. (Specimen without number.) Apparently the same as *Glaziou 8129* and *17046.*)

Chevreulia elegans sp. nov.

Stems and lower leaf-surfaces densely white-tomentose; stems very slender, creeping, densely leafy; leaves sessile, 0.7–1.5 cm. long, 2–4 mm. broad (on some shoots a half narrower, on others twice as broad), oblong, the apex cuspidate and pungent, green and somewhat pilose on the upper surfaces, 1-nerved; heads short-peduncled; involucres turbinate-campanulate, 7–9 mm. long, the scales pale-green, some with purple apex, subglabrous, lanceolate, obtuse, the outer shorter; akenes 3 mm. long, slenderly lanceolate and attenuate; pappus 5 mm. long, copious, white, very little coherent at the base; corolla 5 mm. long, very slender, pale-purple, darker at the summit.

"Rather scarce in dry soil along roadsides." Coripata, Yungas, March 20, 1894. (*No. 2100.*)

POLYMNIA GLABRA DC. Prodr. **5**: 515. (*No. 1813.*) The same as *Mandon 30.*

ECLIPTA ALBA (L.) Hassk. Pl. Jav. Rar. 528. (*Verbesina alba* L. Sp. Pl. 90. *Eclipta erecta* L. Mant. **2**: 286.) "In wet gravelly clay; flowers white; scarce." Near Coripata, February 20, 1894. (*No. 2071.*)

VERBESINA DIVERSIFOLIA DC. Prodr. **5**: 615. "Grows 10 to 15 ft. high, in good soil along roadsides, the flowers white; abundant." Coripata, April 20, 1894. (*No. 2135.*)

VERBESINA SORATAE Sch.-Bip.; Robinson, Proc. Am. Acad. **34**: 551. 1899. (*No. 2036.*) The same as *Rusby 1732.*

SPILANTHES ACMELLA (L.) Murr. Syst. ed. 13. 610. (*Verbesina Acmella* L. Sp. Pl. 901.) (*No. 2024.*) The same as *Rusby 919.*

SALMEA MIKANIOIDES Britton Bull. Torrey Club **19**: 150. 1892. "Climbing 15 to 20 ft. on trees, in wet mould, the flowers yellow." Coripata, April 4, 1894. (*No. 2120.*) The same as *Rusby 1488.*

HETEROSPERMUM DIVERSIFOLIUM H.B.K. Nov. Gen. **4**: 226. (*No. 2032.*) The same as *Spruce 5788.*

HETEROSPERMUM RHOMBIFOLIUM Griseb. Goett. Abh. **19**: 187. 1874. (Specimen without number.)

BIDENS SQUARROSA H.B.K. Nov. Gen. **4**: 238. (*No. 2031.*) The same as *Mandon 53* and *Linden 487* from Caracas.

Bidens pallida sp. nov.

Softly and shortly gray-pubescent throughout; branches elongated, stoutish, pale, finely striate; leaves trifoliolate, the petioles 2–3 cm. long, stout, striate, divaricate or lightly deflexed; lateral

leaflets sessile, 4–6 cm. long, 2–3.5 cm. broad, ovate, inequilateral, lightly cordate, acute, finely serrate, the teeth broadly ovate and mucronate, their sinuses acute, the venation pale, little prominent; terminal leaflets 7–10 cm. long, 3–5 cm. broad, petioluled, otherwise like the lateral; corymbs about 5 cm. broad, very loose, few-flowered, appearing axillary, but terminating the short branches; involucres 5–6 mm. long, hemispherical-campanulate, very loose, the scales lance-ovate, obtusish, strongly 3- to 5-nerved; rays more than 1 cm. long, 6 mm. broad, ovate, thickish, strongly 7-nerved; scales of the disk linear, obtusish, 7 mm. long, 1 mm. broad; akene (in young flower) 2 mm. long, 0.8 mm. broad; pappus 3 mm. long, slender; corolla 5 mm. long, infundibular, the lobes 1 mm. long.

"Climbing 5 to 10 feet over hedges by the roadside; abundant. Flowers yellow." Coripata, Yungas, April 25, 1899. (*No. 2152.*)

CALEA CYMOSA Less. Linnaea 5: 158. 1830. (Specimen without number.)

TRIDAX PROCUMBENS L. Sp. Pl. 900. "A small plant, growing abundantly in coca plantations, the flowers white." Coripata, May 3, 1894. (*No. 2174.*)

VILLANOVA OPPOSITIFOLIA Lag. Gen. et Sp. Nov. 31. (Nos. *1807* and *2893.*) The same as *Mandon 74.*

FLAVERIA CHILENSIS J. F. Gmel. Syst. 1269. (*No. 2026.*) The same as *no. 968.*

TAGETES PUSILLA H.B.K. Nov. Gen. 4: 194. "In dry gravel along roadsides, the flowers yellowish-green." Coripata, March 20, 1894. (*No. 2099.*)

TAGETES MULTIFLORA H.B.K. Nov. Gen. 4: 197. (*No. 2637.*) The same as *no. 53a.*

TAGETES MANDONI Sch.-Bip.; Rusby, Mem. Torrey Club 6: 64. (*No. 2636.*) The same as *no. 1111.*

Pectis substriata sp. nov.

Root stout, vertical, much-branched; stems numerous, erect or ascending, deep-purple, striate, minutely puberulent, very leafy; leaves clasping, 2–4 cm. long, 2–4 mm. broad, tapering from the base to an acute point, entire above, becoming long-setiferous basally, erect, thick and rigid, deep-green, bearing (mostly 2) rows of very large black glands; inflorescence loosely racemiform; peduncles of the heads about 5 mm. long, erect, sharply 4-angled; involucre campanulate, 8 mm. long, the scales 4, ovate, acutish, keeled, the keel rounded, very stout at the base; receptacle 1 mm. broad, sub-globular, black-foveolate; akenes 3 mm. long, oblanceolate, black, appressed-hispid; pappus tawny, coarse, 4 or 5 mm. long, serrate, scanty; some bristles shorter, but without intermixed

scales, the bristles somewhat dilated at the base, those of the ray-flowers much fewer; ray-corollas 7 to 9 mm. long, rather narrow; disk-corollas 5–6 mm. long, cylindraceous-infundibular, the lobes elongated. (*No. 2117.*)

"On dry hills, the flowers yellow. Local name 'Quichamale,' and much used as a blood-purifier." Coripata, Yungas, March 28, 1894.

CHRYSANTHEMUM PARTHENIUM (L.) Pers. Syn. 2: 462. (Specimen without number.)

LIABUM HASTIFOLIUM Poepp. & Endl. Nov. Gen. et Sp. 3: 43. "Grows 4 to 6 ft. high, with bright-yellow flowers, in cultivated ground." Uchimachi, August 20, 1894. (*No. 2390.*) The same as *Rusby 1743.*

LIABUM OVATUM (Wedd.); Ball, Jour. Linn. Soc. 22: 46. 1885. (*Paranephelius ovatus* Wedd. Chlor. And. 1: 214.) (*No. 1842.*)

LIABUM RUSBYI Britton, Bull. Torrey Club 19: 263. 1892. (*No. 1913.*)

Liabum (Munnozia) giganteum sp. nov.

Densely, the upper leaf-surfaces slightly, floccose and yellowish-white; stems very coarse and stout, but weak; petioles (only the upper seen) 0.5–1 dm. long, very stout, the narrow margins connate at the base; blades 1–2 dm. long, and about as broad, triangular, the base truncate, toothed like the rest of the margin, the basal angles outwardly and somewhat downwardly prolonged, acute at the apex, very coarsely toothed, the teeth acute, the sinuses rounded and shallow; leaf very thin, coarsely and broadly 3-costate from near the base; uppermost leaves small, ovate; peduncles axillary, erect, about 1 dm. long, about 10-flowered, bracted, the bracts linear, attenuate, 1–3 cm. long; peduncles of the heads 2–4 cm. long, weak; involucre 1.5–2 cm. long, hemispherical, double, the outer white-floccose, the inner green, the outer scales ovate, acuminate and acute, nerved, the inner lanceolate, successively shorter and narrower, and more chartaceous; rays in several rows, pistillate, fertile, the akene very short, short-pilose, 5-nerved, the pappus 6–7 mm. long, not very copious, rather coarse, serrate, tawny; ray 1.2 cm. long, narrow, pilose; style 3 mm. shorter than the corolla, the branches 2 mm. long, puberulent, linear, lightly flattened; akene and pappus of the disk-flowers similar, the corolla 7 mm. long, narrowly infundibular, pilose, the lobes 1.5 mm. long, oblong; anthers 1.2 mm. long, acuminate, the base entire; receptacle plane, naked.

"Plant 2 to 6 ft. high, in wet, shaded situations as a weed in cultivated ground, the flowers yellow." Sacramento, Yungas, August 14, 1894. (*No. 2379.*)

The same collected by *Pearce* in the valley of Santa Cruz.

SCHISTOCARPHA PANICULATA Klatt, Bull. Soc. Bot. Belg. 31[1]: 210. 1892. (Distributed as "*Eupatorium Vautherianum*", and corrected by Dr. B. L. Robinson.) "Plant 2 to 4 ft. high, growing in wet clay and gravel, near river, the flowers yellow; scarce." Coripata, May 10, 1894. (*No. 2184.*) The same as *Rusby 2126.*

Schistocarpha (?) triangularis sp. nov.

Densely and closely ferruginous-tomentose, except the upper leaf-surfaces and involucres; stems very stout, coarsely angled; petioles (only upper seen) 3–4 cm. long, stout, lightly margined, strongly 3-costate, dilated and confluent at the base; blades 6–15 cm. long, 4–8 cm. broad, triangular-ovate, sub-truncate to subcordate at the base, acute at the apex, distantly dentate, the teeth very small and acute; coriaceous, above shining and glabrous except on the immersed veins, sub-3-nerved, the venation strongly reticulate, prominent underneath; corymbs axillary, on peduncles twice the length of their petioles, stout but weak, the corymbs dense, 5–6 cm. broad; peduncles of the heads about 5 mm. long; heads 8–10 mm. long, nearly as broad; involucres turbinate-campanulate, 5 mm. long, the scales in many series, the outer successively shorter and broader, ovate-lanceolate, obtusish, green with white margins and mostly purple tips, thickish and rigid; ray-flowers white, pistillate, fertile, the akene glabrous, obovoid, 1 mm. long, the pappus yellowish, 4 or 5 mm. long with some shorter ones, rather scanty, coarse, barbellate; corolla nearly 1 mm. long, very slender and pilose below, the limb about half its length, 1 mm. wide, minutely 2-dentate or entire; style-branches 2 mm. long, spirally twisted, terete, papillose, truncate; akene and pappus of the disk-flowers similar, the corolla 7 mm. long, infundibular, the lobes equal, 1.5 mm. long, oblong, obtuse, the anthers caudate and acuminate at the base; receptacle convex, beset with whitish awned chaff.

"Climbing over shrubs in wet forest-mould, the flowers yellow." Unduavi, September, 1894. (*No. 2477.*)

ERECHTITES HIERACIFOLIA (L.) Raf.; DC. Prodr. 6: 294. (*Senecio hieracifolius* L. Sp. Pl. 866.) (*No. 2878.*)

ERECHTITES VALERIANIFOLIA (Wolf) DC. Prodr. 6: 295. (*Senecio valerianifolius* Wolf, Ind. Sem. Hort. Berol. (1825); Reichb. Ic. Bot. Exot. 1: 59.) "In wet clay, growing 3–5 ft. high, the flowers light-blue, abundant." Coripata, March 2, 1894. (*No. 2068.*)

CULCITIUM CANESCENS H. & B. Pl. Aeq. 2: 4, *pl. 67.* (*No.*

1900.) This is much used in the higher Andean regions as a pectoral remedy.

Senecio Antennaria Wedd. Chlor. And. 1: 106. (*No. 1883.*) The same as *Mandon 110.*

Senecio formosus H.B.K. Nov. Gen. 4: 177. (*No. 1958.*) The same as *Rusby 1672.*

Senecio Hohenackeri Sch.-Bip.; Wedd. Chlor. And. 1: 131. (Specimen without number.) The same as *Mandon 145.*

Senecio Pentlandianus DC. Prodr. 6: 421. (*No. 1877.*)

Senecio prunifolius Wedd. Chlor. And. 1: 102. (*No. 2039.*)

Senecio Smithii DC. Prodr. 6: 412. (*Cineraria gigantea* Sm. Exot. Bot. 2 (1805), but the name *Senecio giganteus* is preoccupied.) (*No. 1969.*)

Senecio multinervis Sch.-Bip. (Bull. Soc. Bot. Fr. 12: 80; name only. 1865.)

Stems and branches very stout, many-nerved, the younger portions short-shaggy, many of the hairs reflexed; leaves (only the upper seen) crowded, clasping by a narrowed, petiole-like base, 1.5–3 dm. long, 4.5–9 cm. broad, oblanceolate, acuminate or short-attenuate, very finely and sharply dentate with salient teeth, thickish and apparently fleshy, above bright-green, papillose and very shortly and sparsely hairy, the venation inconspicuous, underneath softly pilose or somewhat floccose, pale, the ferruginous (or purplish in Mandon's specimens) venation rather conspicuous, the secondaries about 30 pairs, lightly ascending, the veins strongly reticulate, broad; panicles terminal, short-peduncled, broad and corymbose, small (less than 1 dm. broad) and dense, or large (3 dm. broad) and rather lax, the branches bracted, the bracts lanceolate, attenuate; peduncles of the heads 0.5–1 cm. long, stoutish; heads nearly 1 cm. long and nearly a half broader as pressed; involucres hemispherical-campanulate, 6 mm. long, of few scales in one series; scales broadly oval-ovate, obtusish, brown with broad whitish margins; rays 7 mm. longer than the scales, reflexed, deep-yellow; akenes very short; tubular corollas infundibular.

"A shrub 6 to 8 ft. high, with yellow flowers, scarce in forest-mould." Unduavi, September, 1894. (*No. 2495.*)

Senecio octophyllus Sch.-Bip. (Linnaea 34: 531; name only. 1866.)

Densely tomentose; stems decumbent or ascending, stoutish, densely leafy; leaves 3–4 cm. long, 0.7–1.5 cm. broad, oblong, blunt, clasping, gray above, yellowish underneath with a very stout midrib and inconspicuous veins, thickish; heads few, corymbose at the summit, 1.5 cm. long, nearly 2 cm. broad, leafy-bracted;

involucre about as long as the flowers, the scales in two series; scales lanceolate, acutish; rays pale-yellow, little exceeding the involucre.

(Specimen without number; the same as *Lechler 2092* from Peru.)

Senecio Sepium Sch.-Bip. (Bull. Soc. Bot. Fr. **12**: 80. 1865.)

Pubescent; stems weak, erect or ascending, nerved or costate, sparsely leafy except near the base; lower leaves petioled, the petioles slender, 1–2 cm. long, the blades 3–6 cm. long, 0.7–1.5 cm. broad, ovate, rounded to subcordate at the base, acuminate and obtusish, thin, dark-green above, paler beneath, the margin finely and sharply serrate, the sinuses broad and rounded; upper leaves similar but gradually more slender, with shorter, margined petioles, at length sessile or clasping; heads corymbose at the summit, the corymb 5–7 cm. broad, linear-bracted; peduncles of the heads 0.5–1 cm. long, slender, angled, thickened toward the summit; heads nearly 1 cm. long, 0.7 cm. broad; involucre campanulate, 12 mm. long, (or in Mandon's specimens 8 mm. long) 1-serialled or with a few small scales at the base; scales linear-attenuate, strongly 3-nerved; rays slender, nearly a half longer than the involucre; pappus very fine and copious, white.

(Specimen without number.) The same as *Mandon 133*.

Senecio biacuminatus sp. nov.

Glabrous except for the lightly floccose peduncles and branches of the inflorescence; stems woody, stout, coarsely angled above; upper leaves sessile by an acuminate base, the lower tapering into a winged petiole 1 or 2 cm. long, lance-oblong, 0.8–1.5 dm. long, 1.5–3 cm. broad, acuminate at both ends, very acute, thickish, sharply serrate toward the apex with appressed teeth, the terete, stout midrib and about 12 pairs of slender, very crooked secondaries prominent underneath; panicle large, pyramidal, the branches stoutish; peduncles of the heads erect, stout, angled, 1–2 cm. long; involucre campanulate, 1 cm. long, sub-2-serialled, the outer scales short and irregular, the inner oblanceolate to obovate, acute, nerved; rays fertile, 2.5 cm. long, bright-yellow, strongly 5–7-nerved; akene 3 mm. long; pappus 9 mm. long, fine, white, not copious; corolla infundibular, the limb rather abruptly campanulate, equaling the pappus. (*No. 1879.*)

This may be the same as *Mandon 147*. Mr. Bang sends another specimen, without number, with larger, sinuately serrate, clasping leaves, narrower involucre, the scales narrower and obtusish and the rays much smaller, which may be a variety of this.

Senecio oblanceolatus sp. nov.

Glabrous excepting the puberulent inflorescence and lower leaf-surfaces; stem stout, branched from near the base, the branches

ascending, stout, flexuous, somewhat angled, densely leafy; leaves sessile by a cuneate, petiole-like base, 7–10 cm. long, 1–2.5 cm. broad, oblanceolate, shortly and acutely pointed, sparsely and sharply fine-serrate, pale-green, especially underneath, where the stout midrib is prominent, thickish, the venation inconspicuous; heads rather few, solitary in the axils of distant leaf-like bracts; the peduncles 2–4 cm. long, slender, linear-bracted; involucre 1 cm. long, broadly turbinate-campanulate, 2-serialled, the outer series basal, very short; inner scales oblanceolate, acuminate and acute; rays not present; akenes 3 mm. long, sharply costate; pappus 8 mm. long, fine, white, copious; corolla 1 cm. long, the greenish tube one-half its length and dilated at the base, abruptly expanded into the broadly infundibular limb. (*No. 2632.*) Species near *S. Swartzii.*

Senecio coroicensis sp. nov.

Glabrous; branches stout, costate; petioles 2 cm. long, stout, channeled above, 3-costate, like the midrib, underneath; blades 0.7–1.5 dm. long, 2.5–5 cm. broad, oblong, acute at the base, short-pointed and acute at the apex, strongly and sharply serrate toward the apex, becoming entire toward the base, dark-green, the venation rather prominent both sides, the principal secondaries 12–14 pairs, whitish, slender, rather crooked, communicating close to the margin and connected by the principal tertiaries; the small, long-peduncled axillary panicles forming a leafy, compound terminal panicle, conspicuously bracted, the bracts lance-linear and attenuate; peduncles of the heads 0.5–1 cm. long, strongly angled; involucres broadly campanulate, 6 mm. long, the scales ovate, acuminate and acute; rays light-yellow, the limb oblong, 5 mm. long; akenes 3 mm. long, oblanceolate, whitish, very strongly angled; pappus 7 mm. long; corolla-tube proper slightly longer than the akene, slender, dilated at the base, passing abruptly into the broadly infundibular limb, which is shorter. (*No. 2435.*)

"A shrub 10 ft. or more high, in rich forest-mould, the flowers light-blue." Coroico, September, 1894. Mr. Bang must have mistaken the plant, as the yellow rays are conspicuous.

Senecio pectioides sp. nov.

Glabrate; root stout, elongated, woody, bearing a dense mass of filiform, elongated rootlets; stem woody, much-branched from near the base, the branches erect, 3–4 dm. long, purple, striate, very leafy; leaves clasping by a narrowed, or on the upper leaves a much dilated base, 2–4 cm. long, 4–8 mm. broad, linear-oblanceolate, acute, coarsely and sinuately dentate, the teeth acute, the large auricles of the upper leaves coarsely laciniate, deep-green above, underneath pale and when young more or less pilose; terminal corymbs small, loose; peduncles of the heads 0.5–1 cm. long;

involucre broadly campanulate, 8 mm. long, the outer circle short, lax, the inner scales oblanceolate, acute; rays deep-yellow, nearly twice the length of the involucre; disk-flowers a little exceeding the involucre. (*No. 1829.*)

Senecio liabifolius sp. nov.

Short scurfy-tomentose, the leaves nearly smooth except upon the veins; stems stout, ascending, flexuous; petioles 1–2 cm. long, stoutish, somewhat dilated at the base; blades 1–1.5 dm. long, 2.5–5 cm. broad, oblong or oblanceolate, acute and entire at the base, sharply serrate upward, abruptly acuminate and acute at the apex, thin but rigid, deep-purple in the specimens, the venation inconspicuous, the secondaries 12–15 pairs, slender, strongly upwardly curved; corymb terminal, 2 dm. or more broad, compound and rather dense, subulate-bracted; peduncles of the heads erect or strongly ascending, slender, several-bracted, 3–6 cm. long; involucres 8 mm. long, broadly campanulate, 1-serialled, the scales ovate, acuminate and acute, purple with broad light margins; rays fertile, apparently light-purple, 1–1.5 cm. long, oblong; akenes 3 mm. long, linear; pappus 8 mm. long, fine, white; disk-corollas purple, 9 mm. long, the lower half narrowly cylindrical, the upper abruptly infundibular-campanulate. (*No. 2033.*)

Senecio tabacifolius sp. nov.

Ferruginous-tomentose, the upper leaf-surfaces papillose and short-stellate; stems 1.2–2 m. high, shrubby, coarsely angled, flexuous; petioles (only upper seen) 2–4 cm. long, stout, subterete; blades 1–3 dm. long, 0.5–1 dm. broad, lance-oblong, obtuse or acutish at the base, acuminate at the apex, finely (the larger leaves obsoletely) serrate, the teeth acute, very thin, venation lightly prominent both sides, the midrib broad and coarse, the secondaries about 15 unequal and irregular pairs, alternating with lesser ones; panicles terminal, short-peduncled, 2–3 dm. long, 1–2 dm. broad, pyramidal, rather lax, the branches and branchlets subulate-bracted; peduncles of the heads slender, 3–5 mm. long; heads 7 mm. long and broad; involucres campanulate, 4 mm. long and (as pressed) 5–6 mm. broad, the scales in one series, or with a few small ones at the base; scales oblong, 3- to 5-costate, obtuse or acutish; rays slightly exceeding the disk; akenes short and stout; pappus fine; white, copious; tubular corollas infundibular.

"A shrub, 4 to 6 ft. high, in wet shaded forest-mould; the flowers beautiful, white [probably referring to the pappus — H.H.R.], the leaves beautiful velvety-green." (*No. 2385.*) Sacramento, Yungas, August 4, 1894.

Senecio prunioides sp. nov.

Younger portions and inflorescence sparsely short-hairy; stems climbing, stout, costate; petioles 1–2 cm. long, rather stout; blades

6–9 cm. long, 2–3 cm. broad, oblong, entire, acute at the base, shortly, obliquely pointed and obtusish at the apex, thin, dark-green above, paler underneath with the midrib prominent, the venation inconspicuous both sides; peduncles of the small panicles much elongated, angled, the branches bracted, the bracts 2–5 mm. long, lance-ovate, acuminate, thin; peduncles of the heads 3–5 mm. long; involucres campanulate, 7 mm. long, the scales in one series, linear-oblong, acuminate, thin, dark-green; akenes 1.5–2 mm. long; pappus 5 mm. long, white, fine, copious; corolla 7 mm. long, the tube slender, the limb broadly campanulate, deeply lobed.

"Climbing 10 to 15 feet upon trees, in forest-mould and clay, the flowers of a dirty yellow, Coroico, Sept. 1894." (*No. 2437.*)

Species near *S. yungasensis* and *S. floccosa*.

Senecio baccharidiflorus sp. nov.

Younger portions, inflorescence and lower leaf surfaces closely and densely tomentose; stems slender, apparently climbing, terete, striate; petioles 1 cm. long; blades 4–8 cm. long, 2–4 cm. broad, oblong or oblanceolate, the lower obtuse or rounded at the base, the upper acute, abruptly short-pointed and acute at the apex, serrulate, the teeth acute, and divergent; thick and coriaceous, glabrous above with the midrib and 12–15 pairs of slender, crooked secondaries impressed, finely reticulate; panicles or their principal branches 2 cm. long, 1.5 cm. broad, ovoid with rounded summit, dense; heads sessile, involucre 3–4 mm. long, broadly campanulate, densely floccose and ferruginous, the closely appressed scales 1-serialled, broadly ovate, the apex rounded or with a short obtusish purple tip, thick, with scarious margins; rays wanting; mature akene scarcely 1 mm. long, obovoid, lightly compressed, 4-angled; pappus 3 mm. long, fine, white, copious, short-barbellate; corolla 3 mm. long, stout, broadly infundibular, lobed more than one-third of the way, the lobes ovate, obtusish, tuberculate-thickened on the face at the apex; anthers long and narrowly caudate at the base, the appendages oblong, obtuse; style thick, the branches 1.5 mm. long, flattened, papillose, the appendages acuminate and penicillate.

"A climber with white flowers, growing in rich forest-mould." Unduavi, September, 1894. (*No. 2494.*)

Senecio sp. near *S. prunifolius*, the inflorescence too immature to admit of a diagnosis. Mr. Bang says: "Grows in rich forest-mould, climbs to a height of about 8 feet and has green flowers." Coroico, September, 1894. (*No. 2459.*)

Senecio, species probably undescribed, but I have too little material. (*No. 2023.*)

Senecio, may possibly be *S. rhizomatus* Rusby. (*No. 1890.*)

? Gynoxis baccharoides Cass. Dict. Sci. Nat. 48: 455. (Specimen without number.) Apparently the same as *Mandon 84.*

Gynoxis discolor sp. nov.

Densely white-floccose except the upper leaf-surfaces; stems slender, finely costate; petioles 0.5–1.5 cm. long, lightly channeled; blades 4–8 cm. long, 2–3 cm. broad, ovate, rounded at the base, shortly and acutely pointed, thick and rigid, above glabrous, pale-green, the midrib lightly depressed, the finely reticulate venation elevated, underneath white, the margin revolute, the terete midrib and the 15–18 pairs of secondaries very prominent, the latter connecting near the margin; peduncles of the axillary panicles 0.5–1.5 cm. long, the inflorescence 1–2 cm. long, nearly as broad; heads very short-peduncled; involucre campanulate, 5 mm. long, 4 mm. broad, the scales 8, oblanceolate, short-acuminate, acutely and stiffly pointed; akenes (immature) 1 mm. long, broad; pappus white, 4 mm. long, slightly exceeding the corolla. (*No. 2280.*)

Gynoxis (?) megacephala sp. nov.

Shortly and densely yellow-tomentose, especially the lower leaf-surfaces, the upper leaf-surfaces nearly glabrous; branchlets elongated, very stout but weak, coarsely sulcate; leaves 2–3 cm. long, 0.8–1.75 cm. broad on a very short, broad petiole, oval, rounded at the base, stoutly mucronate, very thick, deep-green above, deep-yellow underneath, the midrib stout; heads large, short-corymbed at the summit; peduncles of the heads 5 mm. long, stout, angled; involucre campanulate, the scales in two series, the outer sub-herbaceous, or flaccid, about two-thirds the length and breadth of the inner, yellow-tomentose without, purple within, the inner 1 cm. long, erect-appressed, oblong, obtuse, nerved, deep-purple with whitish margins; rays wanting; akenes 2 mm. long, half as broad, obovate, truncate, compressed, 4-angled with intermediate lesser ones; pappus tawny, 8–9 mm. long, short-barbellate, copious; corolla yellow, strongly striate or almost costate, the lower cylindraceous portion of the tube 5 mm. long, slightly contracted above, the remaining portion 4 mm. long, campanulate-infundibular, the lobes 2 mm. long, ovate, acutish; anthers nearly 2 mm. long, the whitish appendages obtuse, the base sagittate but scarcely produced; style-branches 4 mm. long, thick, upwardly flattened and broadened, strongly recurved, the appendages short, broad, obtuse, lightly pilose; receptacle plane, foveolate. (*No. 1959.*)

The same collected by *Pearce* at Huaycani, 11,000 ft., May, 1866.

Werneria caulescens (Wedd.). (*W. nubigena caulescens* Wedd. Chlor. And. 1: 81.) (*No. 1919.*) The same as *Mandon 86.*

WERNERIA NUBIGENA H.B.K. Nov. Gen. 4: 193. (*No. 1918.*) The same as *Mandon 85.*

WERNERIA STRIGOSISSIMA A. Gray, Proc. Am. Acad. 5: 140. (*No. 1830.*)

BARNADESIA VENOSA Rusby, Mem. Torrey Club **6**: 69. With a specimen of this plant, Mr. Bang sends the following statement: "I have found this plant as a tall shrub, the stem as stout as a man's leg, and full of thorns like long needles." Sacramento, Yungas, August, 1894.

Barnadesia inermis sp. nov.

Short-pubescent; branchlets stout, flexuous, mostly about 2 dm. long, very leafy, erect; petioles 0.5–1 cm. long; blades 5–8 cm. long, 1.5–3 cm. broad, oblong, obtuse at the base, very acute or cuspidate at the apex, entire, deep-green, thickish and rigid, glabrous above, with the strongly reticulate venation rather prominent, underneath short-hairy, the hairs appressed, the venation prominent, strongly 3-nerved, the nerves continued into the midrib; peduncles axillary to the upper leaves, about 1 cm. long; stout, erect, about 5-flowered; peduncles of the heads 3–5 mm. long; involucres campanulate, about 1 cm. long, many-serialled, the scales greenish, acute, strongly ciliate, the innermost lanceolate, the outermost successively storter, becoming broadly ovate toward the base, before drying strongly appressed, giving the involucre a strongly contracted summit, in drying becoming strongly recurved; receptacle densely short-scaly; akenes oblong, stout, pilose, 2.5–3 mm. long; pappus coarse, rigid, very strongly plumose, tawny, the plume whitish; corollas 7 mm. long, fissured more than halfway, 5-lobed, the lobes 2 mm. long, narrow; upper portion of corolla reflexed or recurved; anthers 3.5 mm. long, slenderly caudate; style-branches very short, flattened, the apex rounded.

"Climbing very high on trees in damp forest-mould. The flowers are yellow, with an agreable odor, and very different from those of *2335*, which are white." Near Coroico, Yungas, August 5, 1894. (*No. 2372.*)

CHUQUIRAGUA FEROX (Wedd.) Britton, Bull. Torrey Club **19**: 266. 1892. (*No. 2887.*)

Chuquiragua varians (Gardn.). (*Flotovia varians* Gardn. Lond. Jour. Bot. **6**: 454. 1847.) "A thorny climber, with white flowers, growing in wet forest-mould." Calapampa, June 24, 1894. (*No. 2335.*)

Moquinia boliviana sp. nov.

Shortly stellate-tomentose throughout, very slightly upon the upper leaf-surfaces; branches slender, flexuous, slightly coarse-angled below, the internodes about 2–4 cm. long; petioles 1–1.5 cm. long, very stout; blades 0.5–1 dm. long, 3.5–7 cm. broad, ovate, shallowly cordate at the base, rounded and mostly retuse

with a slight apiculation at the apex, thick and rigid, above deep-green, the midrib and secondaries very slightly impressed, the finely reticulate venation sharply elevated, underneath gray, the midrib and 6 or 7 pairs of secondaries very stout, terete and coarse, and somewhat crooked; panicles 2 dm. or more long, as broad or broader, lax, the branches mostly at an angle of about 45°, the branchlets subtended by lance-ovate or oblong bracts, the ovate bractlets at the summit gradually merging into the involucral scales; involucres campanulate, 7 mm. long, squarrose, on peduncles 3–7 mm. long; scales ovate, varying to obovate or oblong-oblanceolate, acutish or obtuse, finely nerved, ciliate, coriaceous, concave; flowers 10, all alike, the akenes 2.5 mm. long, pilose, oblong, slightly compressed, nerved; pappus 1-serialled, 4–5 mm. long, coherent at the base in 5 fascicles, rather coarse, rigid, barbellate, slightly thickened toward the summit; corolla yellowish, 5 mm. long, divided nearly two-thirds of the way, the tube cylindrical, the lobes equal, linear, obtuse, the apex strongly recurved or even revolute, reddish at the tip; anthers nearly 3 mm. long, the appendage lanceolate, acuminate, the caudae long-attenuate; style-branches very stout, oblong, rounded at the apex, thick, compressed. (*No. 2252.*)

THYRSANTHEMA INTEGRIFOLIA (Cass.) Kuntze, Rev. Gen. Pl. 369. (*Seris integrifolia* Cass. Dict. Sci. Nat. 26: 103.) "A small weed, growing in many places, along roadsides, etc., the flowers white." Coripata, March 14, 1894. (*No. 2095.*)

THYRSANTHEMA ROTUNDIFOLIA (D. Don) Kuntze, Rev. Gen. Pl. 369. (*Chaptalia rotundifolia* D. Don, Trans. Linn. Soc. 16: 242. 1830.) (Specimen without number.) The same as *Mandon 12.*

SERIS SAGITTATA Rusby, Mem. Torrey Club 6: 69. "Growing 2 or 3 ft. high, in dry gravel and clay, the flowers rose-colored. Found but once." Coroico, July 30, 1894. (*No. 2365.*)

SERIS APPRESSA (Hook.) Kuntze, Rev. Gen. Pl. 364. (*Centroclonium appressum* Hook. Bot. Mag. *pl. 3115.*) (*No. 1811.*) The same as *Mandon 665.*

PEREZIA INTEGRIFOLIA Wedd. Chlor. And. 1: 40. (*Nos. 1880* and *2029.*)

TRIXIS DIVARICATA (H.B.K.) Spreng. Syst. 3: 501. (*Perdicium divaricatum* H.B.K. Nov. Gen. 4: 155.) "Climbing 10 to 15 ft. high, among shrubs, in gravel and clay along roadsides, the flowers greenish-white; abundant." Coripata, June 24, 1894. (*No. 2289.*)

JUNGIA FERRUGINEA L.f. Suppl. 390. (not Don). "Grows in damp forest-shade and climbs 20 ft. high or more, the flowers greenish-brown." Coripata, June 20, 1894. (*No. 2308.*)

JUNGIA AFFINIS Gardn. Lond. Jour. Bot. 6: 460. 1847. (Specimen without number.) The same as *Gardner 4263*.

Jungia pauciflora sp. nov.

Stems elongated, weak, coarsely angled, pubescent, the yellowish, rather coarse hairs short and reflexed upon the lower portions, longer and spreading toward the summit; stipule-like leaves rounded or broader than long, about 1–1.5 cm. long, in all other respects similar to the leaves; petioles 2–4 cm. long, stout and rigid, costate, pubescent like the stem; blades 0.5–1 dm. long and broad, rotund-ovate, strongly cordate, the sinus mostly broad, crenately lobed, the lobes irregularly crenate-dentate, thick and rigid, above bright-green, harsh, sparsely and very shortly hairy, underneath very pale, softly short-pubescent, strongly 7-nerved, the nerves coarsely branching, the venation coarsely reticulate, prominent both sides, especially underneath; panicle elongated, exceedingly loose and few-flowered, the branches elongated, very slender and weak, leafy-bracted at the base; peduncles of the heads elongated and slender; involucres broadly campanulate, 6 mm. long, ferruginous like the peduncles, the scales lanceolate, rigid, appressed, acute; ray-corollas 1 cm. long, the limb about 5 mm. long, 2 mm. broad, sharply 3-toothed, the whitish pappus two-thirds the length of the ray; disk corollas (not fully mature) 7 mm. long. (*No. 2048.*)

This is very near to *Mandon 16*, and *Matthews'* plant from Chachapoya, Peru, and I am disposed to regard them as identical, although the one here described has stouter and shorter peduncles, larger heads and flowers and the pappus shorter in proportion to the corollas. I do not therefore take up the proposed name of Schultz-Bipontinus.

Jungia orbicularis sp. nov.

Stems elongated, stoutish but very weak (possibly scandent), purplish, coarsely angled, pubescent with short, white hairs; stipule-like leaves semicircular, the pair conspicuously orbicular, 3–8 cm. broad and one-half or more the size of the leaves proper, coarsely crenate; only the upper leaves seen, their petioles 3–6 cm. long, coarse and weak, strongly ribbed, the ribs continued into the midrib of the leaf; blades rotund-ovate, 0.5–1 dm. long and broad, coarsely lobed with broadly ovate, irregularly crenate-dentate lobes, very thin, above bright-green and very sparsely short-hairy, underneath pale or gray and softly short-pubescent, 3-ribbed, or 5- to 7-ribbed by the prompt branching of the lower pairs, the ribs broad and weak, purplish, the venation prominent underneath; panicle elongated, sparsely-flowered, very leafy, the heads partly concealed by the leafy bracts; peduncles of the heads 3–6 mm. long, stout; involucre campanulate, 8 mm. long, green, the scales 7 mm. long, lanceolate, obtuse, the margins toward the base strongly involute;

akene of the young ray-flower 2 mm. long, little contracted above, the (white) ray 9 mm. long, its limb 4 mm. long and 2 mm. broad, oval, lightly 3-toothed, the pappus 5 mm. long, coarse, green, plumose; disk-flowers not fully mature in my specimens, the corollas 6 mm. long, slenderly infundibular, the akene and pappus similar to those of the ray. (Specimens without number.)

Species very near the last, but conspicuously distinct in leaf-texture, the larger stipuloid leaves and the partly concealed inflorescence.

Hieracium trichodontum sp. nov.

Long-pilose throughout, the hairs spreading or even reflexed, above somewhat tangled; stems about 3 dm. long, stoutish, erect, few-flowered; radical leaves erect on petioles 3–6 cm. long, the blades 5–8 cm. long, oblong, tapering into the petiole, obtuse, coarsely reticulate, the cauline similar but becoming sessile and acute; peduncles of the heads 7–10 cm. long; involucres campanulate, about 1 cm. long, the scales lanceolate, acute; corollas nearly 1.5 cm. long, truncate, sharply toothed, the teeth 2–3 mm. long. (*No. 2035.*)

HIERACIUM MICROCEPHALUM Sch.-Bip. Bonplandia **4**: 55. 1856. (Specimen without number.)

Hypochaeris setosus (Wedd.). (*Achyrophorus setosus* Wedd. Chlor. And. **1**: 220.) (*No. 2894.*) The same as *Mandon 278.*

HYPOCHAERIS ACAULIS (Remy) Britton, Bull. Torrey Club **19**: 371. 1892. (*No. 2025.*)

HYPOCHAERIS ELATA (Wedd.) Griseb. Symb. Fl. Argent. 218. (*No. 2009.*)

CAMPANULACEAE

CENTROPOGON YUNGASENSE Britton, Bull. Torrey Club **19**: 371. 1892. "Climbing 8 to 12 feet, upon trees, in wet soil, forest-shade; flowers red." Coroico, September, 1894. (*No. 2432.*) The same as *Rusby 642.*

CENTROPOGON GLORIOSUS (Britton) Zahlb. Bull. Torrey Club **24**: 373. 1897. (*Siphocampylus gloriosus* Britton *l. c.* 19: 373. 1892.) (*No. 2620.*) The same as *Rusby 647.*

CENTROPOGON (?) INCANUS (Britton) Zahlb. Bull. Torrey Club **24**: 374. 1897. (*Siphocampylus incanus* Britton *l. c.* **19**: 373. 1892.) "About 5 ft. high, in very wet ground along roadsides; odor very disagreeable." Coroico, September, 1894. (*No. 2474.*)

SIPHOCAMPYLUS ARGUTUS Zahlb. Bull. Torrey Club **24**: 383. 1897. (*No. 2045.*)

SIPHOCAMPYLUS BOLIVIENSIS Zahlb. Ann. K. K. Nat. Hofm. Wien 6: 443. (*No. 2842.*) The same as *Mandon 496.*

SIPHOCAMPYLUS RUSBYANUS Britton, Bull. Torrey Club 19: 372. 1892. "Growing in mould and clay, in forest, half-climbing to a height of 15 feet, the flowers white." Coroico, September, 1894. (*No. 2433.*)

SIPHOCAMPYLUS FLAGELLIFORMIS Zahlb. Bull. Torrey Club 24: 380. 1897. (*S. angustiflorus* Britton, *l. c.* 19: 373. 1892. non Schlecht.) "Growing in damp forest-mould, and climbing to a height of 40 ft. or more, on trees, the flowers rose-colored; scarce." Uchimachi, July 20, 1894. (*No. 2353.*) The same as *Rusby 646.*

SIPHOCAMPYLUS BILABIATUS Zahlb. Bull. Torrey Club 24: 382. 1897. "Growing in wet shaded clay and climbing slightly; the flowers black and red." Coroico, September, 1894. (*No. 2464.*)

SIPHOCAMPYLUS CORREOIDES Zahlb. Bull. Torrey Club 24: 382. 1897. "Growing in wet mould, in shade, and climbing 2 to 4 ft., the flowers red." Unduavi, September, 1894. (*No. 2483.*)

SIPHOCAMPYLUS ELEGANS BOLIVIENSIS Zahlb. Bull. Torrey Club 24: 381. 1897. "Growing in wet mould and climbing 6 to 10 ft., the flowers red." Unduavi, September, 1894. (*No. 2491.*)

Siphocampylus reflexus sp. nov.

Reclining or climbing, glabrous; stems elongated, slender, terete; petioles 0.5–1.5 cm. long, mostly reflexed or twisted, purplish; blades 3–7 cm. long, 1–2.5 cm. broad, triangular-lance-ovate, truncate to subcordate at the base, regularly acuminate and attenuate at the apex, finely serrate, the teeth reduced to divergent spinules, membranaceous, bright-green, coarsely reticulate with slender, whitish veins; flowers axillary, solitary, scarlet-red; peduncles 4–6 cm. long, slender, slightly tapering upward, angled, mostly recurved; calyx-tube very short, 6 mm. broad at the apex, the lobes strictly deflexed, 1 to nearly 1.5 cm. long, linear, slightly tapering, obtuse, serrate, like the leaves, but more coarsely; corolla-bud strongly clavate-curved; corolla-tube about 4 cm. long, 4 mm. broad at one-fourth of the distance from the broader base, then gradually dilated to 1 cm. (as pressed) near the summit; lobes 1–1.5 cm. long, lanceolate, acutish, lighter-colored, their direction mostly continuous with that of the corolla; essential organs 6 cm. long, the anthers 8 mm. long, lightly curved, strongly costate, lightly barbellate.

Vic. Cochabamba (*No. 2026*, in part). Nearly the same as *Pearce's* specimens from Santa Cruz.

LAURENTIA RAMOSSISSIMA (Mart. & Gal.) Benth. & Hook. f. Gen. Pl. 2: 549. (*Lobelia ramossissima*) Mart. & Gal. Bull. Acad. Brux. 9: [11]. 1842.) (*No. 2247.*)

LOBELIA CLIFFORTIANA XALAPENSIS (H.B.K.) A. Gray, Syn. Fl. N. Am. 2[1]: 7. "Growing in wet clay, in the forest, the flowers violet; scarce." Coripata, April, 1894. (*No. 2162.*)

WAHLENBERGIA PERUVIANA A. Gray, Proc. Am. Acad. 5: 152. 1861. (*No. 1921.*)

VACCINIACEAE

CERATOSTEMMA MANDONI Britton, Bull. Torrey Club 20: 137. 1893. (*No. 1939.*) The same as *Rusby 2632.*

CERATOSTEMMA ELLIPTICA (Hook.) Britton, Bull. Torrey Club 20: 137. 1893. (*Thibaudia elliptica* Hook. Ic. Pl. *pl. 108.*) (*No. 2003.*)

Ceratostemma (?) spectabilis sp. nov.

Pubescent throughout, including the outside of the corolla; branches elongated, stout, densely leafy; petioles 2 mm. long, broad; blades 1.5–3 cm. long, 0.75–1 cm. broad, ovate, blunt, pale-green, obscurely 3-nerved, the midrib very prominent underneath, the venation indistinct; flowers solitary in the axils; bracts at the base of the pedicels 3–5 mm. long, ovate, acuminate and almost pungent; pedicels 0.5–1.5 cm. long, stoutish; calyx-tube 5 mm. long and broad, campanulate, purple-green, the lobes 5 mm. long, broadly ovate, abruptly and acutely short-pointed; corolla 3–4 cm. long, infundibular, deep scarlet-red, the lobes erect, 5 mm. long, triangular-ovate, acute; filaments 3 mm. long, pilose, flattened, lightly coherent at the base; anthers 5 mm. long, dark, the thecae spurred at the base, the spurs 1 mm. long, dilated and incurved, laterally compressed and sulcate, rounded and notched at the base; awns exceeding the corolla-tube, shorter than the lobes, bright-yellow, the upper part dehiscent; style about equaling the stamens; disk annular, adnate, 1 mm. long. (*No. 2605.*)

This differs from the genus to which it is referred in the form of the anther-spurs and especially in its axillary and solitary flowers, yet its affinities seem clearly to be here.

CAVENDISHIA ACUMINATA (Hook.) Benth.; Hemsley, Biol. Cent. Am. Bot. 2: 272. "A shrub about 8 ft. high, growing in very damp forest-mould, the flowers red and green; very scarce." Near Coroico, August 5, 1894. (*No 2373.*) The same collected by *Couthouy* in the Quitensian Andes.

ERICACEAE

PERNETTYA PHILLYREAEFOLIA (Pers.) DC. Prodr. 7: 587. (*Arbutus phillyreaefolia* Pers. Syn. 1: 483.) (*No. 1904.*) This is the same as *no. 766*, *Rusby 2017*, *Mandon 553*, and a specimen collected by *Ball* in western Patagonia. *Bang 2047* may be the same, and is placed here provisionally.

PERNETTYA PARVIFOLIA Benth. Pl. Hartw. 219. (*No. 1907.*) This is the same as *Rusby 2023* and *Triana's* New Grenada *no. 2650.*

GAULTHERIA CONFERTA Benth. Pl. Hartw. 219. (*No. 1905.*) The same as *no. 707.*

GAULTHERIA BRACHYBOTRYS DC. Prodr. 7: 595. (*Nos. 1906* and *2002.*) The same as *Rusby 2014.*

Clethra elongata sp. nov.

Branchlets short, stout, tomentellate, and densely leafy at the summit; petioles 1–2 cm. long; blades 0.8–1.5 dm. long, 3–6 cm. broad, oblanceolate, acute at the base, very short-pointed and acute at the apex, obsoletely serrate, the teeth mere projections of the veins; leaves rather thin, but rigid, above glabrous with the midrib and 12–14 pairs of secondaries narrowly and deeply channelled, underneath sparsely coarse-hairy on the principal veins, the midrib and secondaries very prominent, the tertiaries meeting about midway between the latter; peduncles of the racemes about 2 cm. long, like the slender rachis ferruginous and strongly angled or costate, the raceme 1–1.5 dm. long, sub-erect, rather densely flowered, the pedicels bracted at the base, the bracts linear, about 2 mm. long, abruptly deflexed; pedicels 3–5 mm. long, slender, divaricate; calyx-tube nearly hemispherical, 2 mm. broad, the lobes 2 mm. long, ovate, obtuse, indistinctly 3–5-nerved; petals 3.5 mm. long.

"A stout tree 30 to 35 ft. high, with very pleasantly fragrant white flowers, in forest mould." Uchimachi, Coroico, July 20, 1894. (*No. 2351.*)

MYRSINACEAE

MYRSINE GUIANENSIS (Aubl.) Kuntze, Rev. Gen. Pl. 402. (*Rapanea guianensis* Aubl. Pl. Guian. 1: 121.) (*No. 2049.*) The same as *no. 1463.*

Peckia purpurea sp. nov.

Stems stout, coarsely angled, purple, finely red-scurfy; petioles 1.5–2 cm. long, stout and broad, purple; blades 1.5–2.5 dm. long, 4.5–6.5 cm. broad, oblanceolate, tapering into the petiole, abruptly short-pointed, the point acuminate and acute, entire, thin but rigid,

papillose both sides, the midrib lightly channeled above, terete and very prominent underneath, like the 10–12 pairs of slender secondaries, which are strongly ascending and connected by the tertiaries; racemes about 1.5 dm. long, very slender, erect, strongly angled, red-scurfy, loosely-flowered; pedicels 2.5 mm. long, the ovate basal bract half as long; sepals scarcely 1 mm. long, broadly ovate, the apex rounded, like the corolla-lobes, purple with the margin lighter; corolla-lobes nearly 2 mm. long, broadly oval or suborbicular; stamens very short; flowers staminate only. (*No. 2048.*)

Species very near *Rusby 1218.*

Clavija tarapotana Spruce, MS.

(Distributed as "*C. lancifolia* Desf.")

Shrub 1 to 2 m. high, slender, glabrous; leaves 30–45 cm. long, 5–8 cm. wide, oblanceolate, acute, the margin obscurely sinuate, tapering into a very short, stout petiole; thick, light-green and drying yellowish, the midrib very stout, lightly channeled above; principal secondaries about 20 on each side with as many alternating ones nearly as strong, the venation finely reticulate, strong; racemes 15–20 cm. long, simple, slender, loosely flowered; bracts about twice the length of the bud-bearing pedicel, ovate, acuminate and acute, thin; pedicel stout, 3 mm. long at flowering, bearing a very small bractlet at about the middle; calyx 4 mm. broad, the segments broadly oval, the summit rounded, minutely ciliate; corolla 9 mm. broad, of similar form; pistil 3 mm. long, the peltate white stigma nearly 2 mm. broad, 12-lobed; staminate flower not seen.

"Scarce in shade, in rich forest-mould, the flowers yellow." (*No. 2158.*) The same as *Rusby 1219.*

SAPOTACEAE

Chrysophyllum ilicioides sp. nov.

Branchlets numerous, slender, gray; petioles 0.5–1 cm. long, channeled; blades 4–8 cm. long, 2.5–4 cm. broad, ovate, rounded at the base, very short-pointed and acutish at the apex, entire, glabrous, dark-green, above shining with the midrib channeled, midrib very prominent underneath, the secondaries very numerous, slender, nearly straight; fascicles about 10-flowered; pedicels slender, 3–5 mm. long; calyx 1 mm. long and a little broader, hemispherical-cupulate, shallowly lobed, the lobes rounded; corolla sub-rotate, 5 mm. broad; filament subulate, about as long as the broadly ovate anther, inserted upon the base of the corolla-lobe; ovary broadly ovate, purple, reaching to the base of the corolla-lobes; style conical, short; stigma capitate, white; ovules basal.

"A tree 20 to 30 ft. high, the flowers green." In the forest, near the River Tamampaya, Coripata, Yungas. April 26, 1894. (*No. 2157.*)

Sideroxylon Bangii sp. nov.

Branchlets numerous or crowded, short, stout, up-curved, lightly ferruginous toward the summit, marked by broad, saucer-shaped leaf scars; petioles 1–1.5 cm. long, stout, channeled, striate underneath; blades 0.5–1.5 dm. long, 2–8 cm. broad, oval, obtuse or sub-rotund at the base, slightly pointed but blunt or even notched at the apex, entire, coriaceous, slightly shining above, with the venation lightly prominent, ferruginous underneath, especially upon the midrib, which, with the 12–15 pairs of lightly upcurved secondaries, is very prominent; fascicles 1- to about 7-flowered; bracts very short; pedicels 0.5–1 cm. long, stout, erect, thickened upward; calyx cupulate, 2 mm. long by 3 mm. broad, lobed nearly half-way, the lobes semicircular or broader, thick and rigid; flowers not seen; young fruit narrowly ovoid, densely and coarsely ferruginous-pilose, narrowing into a short, black, glabrous beak. (*No. 1953.*)

STYRACEAE

Symplocos Mathewsii A. DC. Prodr. 8: 250. (*No. 2156.*) The same as *Rusby 2686.*

Symplocos colorata Brand. "A tree 20 ft. high, growing in rich mould, in forest." Near Coroico, July 10, 1894. (*No. 2332.*) This is the same as a specimen collected by *Pearce*, the two together being announced as the type.

Symplocos flavescens sp. nov.

Branchlets short and stout, shortly ferruginous-tomentose; petioles 0.5–1 cm. long, very stout and broad; blades 4–8 cm. long, 2.5–5 cm. broad, oval, lightly cordate at the base, very shortly pointed and obtusish at the apex, finely serrate, the teeth short and broad, obtuse or acute; leaf thick and rigid, above bright yellowish-green and nearly glabrous with the venation lightly impressed, underneath shortly and rather coarsely yellow-pubescent, the coarsely reticulate venation very prominent; panicles 1–3 cm. long and broad, about 6–10-flowered, very shortly and stoutly peduncled, the flowers sessile, mostly in threes at the ends of branchlets; calyx tomentose, especially above, the tube ovoid, contracted at the mouth, 8 mm. long, the lobes appressed or inflexed, 2 mm. long, broadly triangular-ovate, obtuse; corolla deep-purple, coriaceous, deeply 7-parted, the lobes 4 mm. long, nearly 2 mm. broad, lance-ovate, obtuse, pubescent within; stamens inserted at the summit of the short tube, in two series, the upper anantherous in my specimens, filaments subulate,

flattened, the outer series twice as long and broad; anthers bright-yellow, small, nearly quadrate; style thickish, persistent, the stigma obscurely 3-lobed. (*No. 1895.*)

STYRAX OVATA (R. & P.) A. DC. Prodr. 8: 267. (*Foveolaria ovata* R. & P. Syst. Veg. 100.) (*No. 2867.*)

APOCYNACEAE

? MALOUETIA sp. (Specimen in fruit, and without locality or date.) The same as *Rusby 2390.*

Laubertia (?) **laxiflora** sp. nov.

Glabrous; branches stender, terete; leaves opposite; petioles 4–5 mm. long, broad; blades 0.8–1.2 dm. long, 3–4.5 cm. broad, oblong or oval to slightly ovate, abruptly short-acuminate and obtuse, deep-green and shining above, drying yellowish-green underneath, the midrib channeled above, very prominent underneath, the 5 or 6 pairs of very slender secondaries strongly incurved, connected by the tertiaries; panicle terminal, the branches very few, 1–2 dm. long, sub-filiform, drooping, flexuous, very sparsely flowered; bracts very small, ovate, thickish; pedicels mostly about 1 cm. long, slender, dilated at the junction with the calyx, 3 mm. broad at the sub-truncate base, appendaged within, just below the sinuses, with 5 small ligules; the lobes somewhat unequal, about 3 mm. long, tightly inflexed against the corolla-tube, broadly ovate, obtuse; corolla apparently white, strongly and broadly nerved, the tube 6 mm. long, cylindrical and slightly contracted upward, the throat lightly pilose within, the limb broadly infundibular, 1.2 cm. long, the lobes 5–6 mm. long and broad, sub-rotund, entire, 3–5-nerved; filaments inserted at the summit of the tube, lightly pilose, ligulate, narrowly margined above, 2 mm. long, nearly 1 mm. broad; anther 3 mm. long, acuminate and acute, sagittate, the free portion of the lobes 0.5 mm. long, acute, the tips lightly incurved; lobes of the disk broadly obovate, thick, lightly connate at the base in two pairs, the fifth entirely free; style thick and dilated below, gradually becoming filiform at the summit, the stigma 1 mm. long, nearly as broad, 5-lobed, annulate; only very young fruit seen, the ovaries separate, lanceolate, acuminate and acute, the apices incurved. (*No. 2056.*)

This very interesting plant differs from the meager descriptions of the little known genus *Laubertia* in the presence of the ligules of the calyx, which may very easily have been overlooked in previous specimens. The young fruit, moreover, looks as though it may develop something very different from the slender follicles described. When better known it may be found to represent an undescribed genus.

ECHITES PELTATA Vell. Fl. Flum. 110; 3: *pl. 32.* (*No. 2804.*)

Echites cyaniphylla sp. nov.

Glabrous; stems very slender, purple, finely many-nerved; petioles 1–2 cm. long, slender, keeled; blades 0.6–1 dm. long, 2–4 cm. broad, oval, varying to ovate or obovate, mostly inequilateral, the base broad but slightly produced, abruptly short-acuminate and cuspidate at the apex, deep-green, the younger purple, the venation slender, lightly prominent both sides, coarsely reticulate; peduncles 2–3 cm. long, thicker at the summit, not dichotomous; pedicels about 1 cm. long; calyx-tube short-cupulate, 3–4 mm. broad; lobes 5 mm. long, lance-oblong, obtuse, faintly nerved, their sinuses acute; corolla greenish-yellow, hypocrateriform, the tube about 12 mm. long, dilated at base and summit, the limb in bud broadly ovate and acutish, the lobes 8–10 mm. long, obovate; follicles 3 dm. or more long, lightly curved, 5–7 mm. thick, as pressed, scarcely acute; seed 12 mm. long, inequilaterally lance-oblong, dark-green with white nerves and a short whitish beak, the coma about 1.5 cm. long, spirally twisted, white, copious. (*No. 2267.*)

Probably the same as a specimen in herb. Kew collected by *Saunders* at Bogota, but not the same as *Rusby 2383*, which it closely resembles.

Echites Bangii sp. nov.

Glabrous; petioles 1–2 cm. long, flat, striate; blades 0.7–1.5 dm. long. 3–7 cm. broad, oval or oblong, rounded to subcordate at the base, abruptly and very acutely short-pointed, thin, deep-green above, drying yellowish underneath, the slender midrib and 6 or 7 pairs of secondaries sharply prominent underneath, the latter connected by the crooked tertiaries; peduncles 3–4 cm. long, loosely about 10-flowered; pedicels 1–1.5 cm. long, stoutish, subulate-bracted; calyx-tube cupulate, 1.5 mm. long, 5 mm. broad, truncate at the base, the lobes 4 mm. long, ovate, recurved at the apex, the sinuses rounded; corolla-tube nearly 2 cm. long, 7 mm. broad as pressed, cylindrical, the middle portion somewhat dilated, the lobes abruptly spreading, 1 cm. long; immature pod 4 dm. long, linear and very slender. (*No. 2053*, in part, and *2054*, in part. An *Arenaria* was also numbered *2053*.)

? ECHITES sp. flowers wanting. (*No. 2844.*)

? ECHITES sp. Neither flowers nor fruit present. (*No. 2271.*)

Mandevilla boliviana (Britton) Rusby. (*Echites boliviana* Britton; Rusby, Mem. Torrey Club 4: 219.) (*No. 2057.*) The same as *no. 551* and *Rusby 2381.*

Mandevilla Rusbyi Britton, sp. nov.

Coarsely and somewhat harshly short-tomentose throughout, in-

cluding the outer surface of the corolla and the fruit, the hairs glistening, the upper leaf-surfaces somewhat strigose; stems stoutish, terete; petioles 0.75–1.5 cm. long, very stout; blades 0.7–1.2 dm. long, 3.5–6 cm. broad, oval varying to slightly ovate or obovate, narrowly cordate at the base, abruptly and acutely short-pointed at the apex, thick and coriaceous, of a rather deep green above, gray underneath, the rather coarse midrib and primaries lightly prominent both sides, the latter about 12 pairs, nearly at a right-angle with the midrib and slightly ascending; peduncles rather short, the rachis flexuous, nodose, many-flowered; pedicels stout, angled, about 5 mm. long; calyx 7–9 mm. long, deeply cleft, the lobes broadly ovate, and narrowly and acutely acuminate; corolla thickish, the cylindrical portion of the tube nearly 2 cm. long, the broadly infundibular throat more than 1 cm. long, the lobes 1.5–2 cm. long, apparently acute; pods linear, about 1 dm. long, less than 5 mm. broad, bearing about 7 constrictions, lightly curved, the pair coherent at the apex; seed 8 mm. long, oblong, obtuse, deep-purple, the copious, dense, tawny coma 1.5 cm. long. (*No. 2843.*)

The same as *Rusby 2387*, from which the description of the seed is taken.

Dipladenia cuspidata sp. nov.

Softly canescent, the upper leaf-surfaces nearly glabrous except along the midrib; stems simple, erect, stout, in my specimens 5–7 dm. high; stipules 4 mm. long, 2.5 mm. broad, triangular-ovate, acute, purplish-brown; petioles 3–5 mm. long and nearly as broad; blades 0.5–1 dm. long, 3–6 cm. broad, oval, lightly cordate, broadly cuspidate, entire, coriaceous, thick, the midrib and 6 pairs of secondaries slightly impressed above, prominent underneath, the secondaries communicating close to the margin, the venation finely reticulate; flowers shortly racemed at the summit, the base partly concealed by the upper leaves; pedicels 5–9 mm. long, very stout; calyx 7 mm. long, campanulate, lightly contracted toward the summit, lobed nearly half way, the lobes very broad, overlapping, rounded at the apex; corolla 7 cm. long, the tube infundibular, passing gradually into the broadly campanulate limb, purple (?), coriaceous. (Specimen without number, or data.)

Species near *D. gentianoides* and similar to *Pearce 797*, but the indumentum is not the same.

? Rhabdadenia sp. Flowers wanting. (*No. 1950.*)

ASCLEPIADACEAE

Amblystigma pedunculare Benth. in Hook. Ic. Pl. **12**: 77. *pl. 1188.* (This was sent by Mr. Bang as part of *no. 1254*, which is *Schistogyne attenuata* Rusby, and some may have been distributed under that number.) It is the same as *Mandon 353*.

Oxystelma solanoides (H.B.K.) K. Schum.; E. & P. Nat. Pfl. 4^2: 229. (*Philibertia solanoides* H.B.K. Nov. Gen. 3: 196, *pl. 230.*) (*No. 1815.*) The same as *Mandon 352* and *Rusby 1973.*

Oxystelma Vailiae Rusby *ante*, p. 315. (*No. 2005.*) The same as *no. 985.*

Araujia grandiflora (Mart. & Zucc.) Morong, Trans. N. Y. Acad. Sci. 12: 161. (*Schubertia grandiflora* Mart. & Zucc. Nov. Gen. 1: 57.) "Grows in wet soil near river, the flowers creamy-white; scarce." Coripata, March 11, 1894. (*No. 2088.*)

Gothofreda propinqua (Decne.) Kuntze, Rev. Gen. Pl. 420. (*Oxypetalum propinquum* Decne.; DC. Prodr. 8: 582.) This may prove to be a distinct species. The appendages are a little longer. It was sent by Mr. Bang as a part of *no. 1254.*

Asclepias cochabambensis Rusby, Mem. Torrey Club 4: 221. (*No. 2059.*) The same as *no. 982.*

Asclepias curassavica L. Sp. Pl. 215. "Grows 2–4 ft. high, in wet clay along roadsides, the flowers red and yellow." Calapampa, July 22, 1894. (*Nos. 2060* and *2358.*)

Metastelma Mathewsii Rusby, Bull. Torrey Club 25: 497. 1898. "Grows in rather wet mould; scarce." Coripata, March 12, 1894. (*No. 2090.*) The same as *Rusby 2543.*

Amphistelma (*Metastelma*) **Pearcei** sp. nov.

Softly grayish-pubescent throughout; branchlets slender, rather rigid, terete; petioles 4–6 cm. long, very slender; blades 1–2 cm. long, 0.7–1.5 cm. broad, ovate, rounded at the base, pungently mucronate at the apex, the very slender venation inconspicuous on both sides; flowers solitary or 2–3-fascicled, nearly sessile; calyx 2 mm. broad, the short tube acute; corolla-tube short-cupulate, 1 mm. broad, the lobes nearly 2 mm. long, lance-linear, spreading; crown scarcely equaling the stamens, fleshy, erect, cupulate, irregularly and rather deeply 5-lobed. Fruit not seen.

"Scarce in rich, stony soil. A climber, with greenish-white flowers." Coripata, March 15, 1894. (*No. 2089.*)

Ditassa racemosa Britton; Rusby, Bull. Torrey Club 25: 498. 1898. "Grows 8–10 ft. high each year, after being burned. Grows in clay and gravel." Coripata, April 22, 1894. (*Nos. 2140* and *2845.*) Mixed with *no. 2140* was sent a totally different plant, in fruit (the fruit tomentose), the genus not determinable, possibly a *Metastelma.* The same as *Rusby 2546.*

Ditassa apiculata sp. nov.

Branchlets slender, finely striate, pubescent with short, spreading or slightly reflexed hairs; petioles 2–4 mm. long, stout; blades 2–4 cm. long, 0.5–1.5 cm. broad, oblanceolate, acute at the base, pungently mucronate at the apex, thickish, deep-green above, pale underneath, the finely reticulate venation inconspicuous on both sides, the whitish midrib very stout and prominent underneath; peduncles of the umbels 2–3 mm. long, stout; umbels loosely about 5-flowered; pedicels nearly 1 cm. long, ribbed; calyx green, crateriform, 3 mm. broad, divided to the base, the lobes ovate, acute, the margins hyaline; corolla thickish, pubescent within, the tube tuberculate, nearly 2 mm. long, the lobes lanceolate, obtuse, 5 mm. long, erect-spreading; filament-tube 1 mm. long, a little shorter and half as broad as the anther-tube; crown free from the corolla, adnate to the filaments up to the base of the anthers, of 5 ligules; body of the ligules a little more than 1 mm. long, oval-obovate, concave, appendaged at the apex with a linear, attenuate tail 2 mm. long and from the middle of its concave face with a smaller one which exceeds it by nearly 1 mm.; apical anther-appendages erect, ovate, slightly pointed, nearly 1 mm. long and as long as the broadly conical, obtuse, white stigmatic disk. (*No 2846.*)

Vailia mucronata Rusby, Bull. Torrey Club **25**: *11.* 1898. (*No. 2058.*) The same as *no. 1275* and *Rusby 2547.*

LOGANIACEAE

Spigelia elongata Britton; Rusby, Bull. Torrey Club **25**: 542. 1898. (*No. 2507.*)

Buddleia verbascifolia H.B.K. Nov. Gen. **2**: 351. "A shrub about 15 ft. high, growing in damp clay, the flowers yellowish-green; scarce." Calapampa, July 18, 1894. (*No. 2349.*) The same collected by *Triana* in New Granada.

Buddleia montana Britton, Bull. Torrey Club **25**: 544. 1898. (*No. 1838.*)

Buddleia coroicense sp. nov.

Ferruginous-tomentose, except the upper leaf-surfaces, which are lightly scabrous; branchlets elongated, very slender, waving; petioles 0.5–1.5 cm. long, very stout, inserted into a low cup-shaped base; blades 1–1.5 dm. long, 2.5–6 cm. broad, ovate, rounded at the base, acuminate and acute at the apex, the slender venation obscure above, sharply prominent underneath; heads loosely racemed, about 1 cm. broad, subtended by lance-linear bracts about two-thirds of their length; calyx 3 mm. long, lobed half-way, the lobes and sinuses of similar form, triangular-ovate and acutish; corolla-

tube campanulate, 3 mm. long, the lobes 2.5 mm. long, spreading abruptly, nearly semicircular, but the margins strongly recurved, making them appear triangular and acute; anthers about 1 mm. long, oval, minutely apiculate, the filaments very short; disk saucer-shaped, 1 mm. broad, ovary globose or a little elongated, 1 mm. broad; style 1.5 mm. long, stout, curved, the stigmas 1 mm. long, darker than the style.

"Climbing 4 to 6 feet high in dry mould, the flowers white [but they are evidently deep-purple— H.H.R.]." Near Coroico, Yungas, July 8, 1894. (*No. 2327.*) *Pearce's* specimens, collected at the same place, July 1866, are less tomentose. *Mandon 347* may be the same.

GENTIANACEAE

Microcala quadrangularis (Lam.) Griseb. in DC. Prodr. 9: 63. (*Gentiana quadrangularis* Lam. Encyc. 2: 645.) (*No. 1868.*)

Rusbyanthus cinchonifolius Gilg; E. & P. Nat. Pfl. 4^2: 95. (Specimen without number.)

Gentiana primulifolia Griseb. Gen. et Sp. Gent. 221. (*Nos. 1888* and *1889.*)

?Gentiana incurva Hook. Bot. Misc. 2: 228. 1831. (*No. 2025.*) The specimen is not in good condition. It is apparently the same as *Spruce 5570*, *Lobb's* Columbia *334* and specimens collected by *McLean* at Cerro de Pasco and by *Bridges* and by *Pearce.*

Gentiana punicea Wedd. Chlor. And. 2: 70. (*No. 2671.*)

POLEMONIACEAE

Cantua pyrifolia Juss. Ann. Mus. Par. 3: 117. 1804. (*No. 3002.*)

Microsteris gracilis (Dougl.) Greene, Pittonia 3: 301. (*No. 1874.*)

BORAGINACEAE

Tournefortia Salzmanni A. DC. Prodr. 9: 524. "Grows 2–4 ft. high, in wet clay, the flowers green; scarce." Coripata, Yungas, March 1, 1894. (*No. 2076.*) The same as *Mandon 389* and *Glaziou 11295.*

Tournefortia andina Britton; Rusby, Bull. Torrey Club 26: 148. 1899. (*No. 1775.*)

TOURNEFORTIA OBSCURA A. DC. Prodr. 9: 517. "A shrub about 5 ft. high, with greenish-white flowers; in mud and clay." Coroico, September, 1894. (*No. 2470.*) The same as *Rusby 1922.*

Tournefortia ovalifolia sp. nov.

Branchlets elongated, stoutish, purple, harsh, with very short, stout, scattered hairs, the hairs of the inflorescence, calyx and corolla becoming more slender and soft; petioles about 1 cm. long, broadly channeled, dilated at the base; blades 0.6–1 dm. long, 3–6 cm. broad, oval, abruptly slightly produced at the base and abruptly and acutely short-pointed, thin, dark-green, the venation not prominent above, the midrib and 10–12 pairs of strongly ascending secondaries prominent underneath, yellowish or purplish; peduncle 2–3 cm. long, stout; cyme successively bifurcating, the branches elongated and stout and the cyme ultimately very broad; flowers about 2–3 mm. apart; pedicels 2–3 mm. long, stoutish; calyx 2 mm. long, 1.5 mm. broad, deeply parted, the base truncate, the lobes lanceolate, erect; corolla-tube cylindraceous, 5 mm. long, 1.5 mm. broad as pressed, the lobes 1.5 mm. long, rotund-oval; style 3 mm. long, very stout, the stigma 1 mm. long, conical, 1 mm. broad and annulate at the base; fruit (mature?) globose-ovoid, 3 mm. long and broad.

"A small plant with green flowers; scarce in forest-mould." Unduavi, September 4, 1894. (*No. 2488.*)

HELIOTROPIUM INUNDATUM Swartz, Prodr. Veg. Ind. Occ. 40. (*No. 2848.*)

Heliotropium (*Orthostachys*) **Bangii** sp. nov.

Gray-pilose with rather short, appressed hairs; stems numerous from a short base, spreading, 1–1.5 dm. long in my specimens, slender; petioles 3–7 mm. long, broad; blades 1.5–3 cm. long, 0.5–1 cm. broad, oval-ovate, acute at the base, blunt or obtuse at the summit, bright-green, the midrib and 2 or 3 pairs of secondaries impressed above, at least in the young leaves, very prominent and strongly pilose underneath; cymes in the upper axils, 3–5 mm. long, racemiform; pedicels 2 mm. long; calyx campanulate in flower, parted to the base, the lobes 2 mm. long, oval, obtusish; corolla-tube 1 mm. long, campanulate with contracted summit, the lobes nearly 1 mm. long, spreading, white; anthers less than 0.5 mm. long, ovate, short-acuminate, reaching to the base of the lobes; pistil 0.5 mm. long; ovary brownish-yellow, globose; stigma about half as large as the ovary; fruit a little more than 2 mm. broad, a little less than 2 mm. long, compressed, umbilicate at the apex, cordate at base, papillose, the nutlets closely coherent in pairs. (*No. 2847.*)

Nos. 1971 and *2505* are the same.

ERITRICHIUM WALPERSII (A. DC.) Wedd. Chlor. And. **2**: 90. (*Antiphytum Walpersii* A. DC. Prodr. **10**: 122.) (*Nos. 1908* and *1962*.) The same as *Mandon 379* and *Rusby 2581*. Not the same as *Mandon 381*.

CONVOLVULACEAE

IPOMOEA FLORIBUNDA Moric. Pl. Nouv. Am. 46. *pl. 31*. (*No. 2246*.) The same as *Rusby 1994*.

?IPOMOEA PES-CAPRAE (L.) Roth, Nov. Pl. Sp. 109. (*Convolvulus Pes-caprae* L. Sp. Pl. 159.) (*No. 1992*.)

IPOMOEA OPULIFOLIA Rusby, Bull. Torrey Club **26**: 144. (*No. 2506*.)

CALONYCTION ACULEATUM (L.) House, Bull. Torrey Club **31**: 590. 1904. (*No. 2027*.) The same as *no. 589* and *Rusby 1990* and *1993*.

PHARBITIS HEDERACEA Choisy, Mem. Soc. Phys. Genèv. **6**: 440. 1833. (*No. 2850*.)

PHARBITIS PURPUREA (L.) Voigt, Hort. Suburb. Calc. 354. (*Convolulus purpurea* L. Sp. Pl. ed. 2. 219. *Pharbitis hispida* Choisy, Mem. Soc. Phys. Genèv. **6**: 440. 1833.) "The small flowers red, half-red and half-white, and sometimes quite white." Coripata, March 28, 1894. (*No. 2113*.) This is the same as *no. 750* published as "*Ipomoea* sp."

JACQUEMONTIA DENSIFLORA Rusby, Bull. Torrey Club **26**: 151. 1899. (*No. 2849*.) The same as *Rusby 1845*.

EVOLVULUS HOLOSERICEUS H.B.K. Nov. Gen. **3**: 116. (*No. 2006*.) The same as *Mandon 1492*.

EVOLVULUS CANESCENS Meissn. in Mart. Fl. Bras. **8**: 350. (*No. 2274*.)

DICHONDRA REPENS Forst. Char. Gen. 40. *pl. 20*. (*No. 2212*.)

SOLANACEAE

SOLANUM ASARIFOLIUM Kunth & Bouché, Ind. Sem. Hort. Berol. **1845**: 10. (*No. 2521*.) The same as *no. 1235*.

SOLANUM ASPERUM Vahl, Eclog. Am. **2**: 17. (Specimen without number.) The same as *Rusby 722* and *788*.

SOLANUM ATRIPLICIFOLIUM Gill.; Nees, Nov. Act. Nat. Cur. **19**: Suppl. 1: 386. 1843. "A small, widely branching plant, growing in sand, among stones, near the river. But one found. Flowers white." Coroico, August, 1894. (*No. 2392*.)

Solanum bolivianum Britton, sp. nov.

A large shrub, bearing scattered small, nearly straight, short and stout yellow prickles on the branchlets and lower surfaces of the petioles and midribs, all of which are of a very dark-brown; petioles thickish but weak, 3–6 cm. long; blades 2–3 dm. long and more than two thirds as broad, inequilaterally oval-ovate, obscurely cordate at the base, very coarsely few-toothed with rounded sinuses, thin, dark-green, minutely scabrous above, minutely ferruginous underneath, with 5–7 coarse flat secondaries on each side; cymes small (those seen about 7 cm. broad and about 20-flowered), on short and slender peduncles; mature bud oblong, obtuse, about 1 cm. long, 4 mm. broad; calyx 5 mm. broad, the tube cupulate, the lobes broadly ovate and short-acuminate, the sinuses rounded; corolla 1.5 cm. or more broad, deeply lobed, apparently white; anthers 5–6 mm. long, nearly straight, narrowly lanceolate; style slender, nearly twice the length of the anthers.

"A shrub, 20 ft. high, growing on sandy river-bed." Coroico, September, 1894. (*No. 2436*, type.) The same as *Rusby 778*.

Solanum cymosum R. & P. Fl. Per. **2**: 31. *pl. 160*. (*No. 2870*.)

Solanum campylocladum Magdalenae Dunal, in DC. Prodr. **13**[1]: 173. (*No. 2523*.) Probably a *Brachistus*, but I have no flowers of the plant. The same as *Rusby 784* and *798*.

? Solanum clavatum Rusby, Mem. Torrey Club **6**: 87. (*No. 2618*.) The buds and flowers are fully twice as large as in the type, and more elongated.

Solanum decorum Sendtn. in Mart. Fl. Bras. **10**: 83. (*No. 2516*.) The same as *Spruce 1873*.

Solanum granuloso-leprosum Dunal, in DC. Prodr. **13**[1]: 115. "A shrub, 6 to 8 ft. high, in wet forest-mould, the flowers white." Unduavi, September, 1894. (*Nos. 2478* and *2528*.) It is the same as Grisebach's "*S. verbascifolium*" in Herb. Kew, from the Argentine.

Solanum leptocaulon Huerck & Muell.-Arg. in Huerck, Obs. Bot. 40. (*Nos. 1914* and *2024*.) The same as *Mandon 404*.

Solanum lilacinum Rusby, Bull. Torrey Club **26**: 189. (*No. 2023*.)

Solanum Lindenii Rusby, Mem. Torrey Club **6**: 88. "A shrub, 4–6 ft. high, in rich forest-mould near the river; abundant." Coripata, May 12, 1894. (*No. 2188*.)

Solanum lycioides L. Mant. 1: 46. (*No. 2508.*) The same as *Rusby 803*. Not *Rusby 833* or *835*, nor *Bang 32*, which were published under this name. The last three represent a distinct species which is published below.

Solanum Maglia Schlecht. Hort. Hal. 6. (*No. 2519.*)

Solanum Mandonis Huerck & Muell.-Arg. in Huerck, Obs. Bot. 78. Coroico, August. (*No. 2619.*) *No. 2075* is probably also of this species. Of this Mr. Bang says: "A tree 15 ft. high, growing in dry clay, the flowers yellow and blue." Coripata, March 6, 1894.

Solanum myrianthum Britton, Bull. Torrey Club **26**: 191. 1899. (*No. 2514.*)

Solanum ochrophyllum Huerck & Muell.-Arg. in Huerck, Obs. Bot. 50. (*No. 1931.*) This is the same as *no. 1630*, which was published without specific name.

Solanum pterocladum Huerck & Muell.-Arg. in Huerck, Obs. Bot. 44. (*No. 2872.*)

Solanum psidiifolium Rusby, Bull. Torrey Club **26**: 194. (*No. 2250.*) At different times, Mr. Bang sent two forms under this number. The typical plant is sparingly stellate-pubescent, the leaves broad, inequilateral and obtuse, the flowers in small, short-peduncled, pseudo-axillary cymes; the other densely stellate, the leaves narrower, equilateral, acute, the cymes looser and larger and long-peduncled. The difference is probably due to the latter being on young shoots, the former on old branchlets. The narrow-leaved form closely resembles *S. Lindenii*, but that is glabrous.

Solanum pycnanthemum Mart. Flora **20**[2]: Beibl. 120. 1837. (*No. 2869.*)

Solanum radicans L. f. Dec. 1: 19. *pl. 10.* "Grows about houses, the flowers white and yellow. Used medicinally as a blood purifier, under the name of 'Cuti-cuti.'" Coripata, February 22, 1894. (*No. 2062.*)

Solanum Rusbyi Britton; Rusby, Bull. Torrey Club **26**: 191. 1899. (*No. 1881.*)

Solanum tabacifolium Salzm.; Dun. in DC. Prodr. **13**[1]: 261. (*Nos. 2527* and *2868.*) The same as *Burchell 4938* and *Gardner 553*.

Solanum validum Rusby, Mem. Torrey Club **4**: 230. (*No. 2511.*)

Solanum (*Inermes*) vulpinum sp. nov.

Very densely and thickly stellate-tomentose, the younger portions deep rusty-red, the older yellow-gray; shrubby, the very stout (8 mm. thick) branchlets hollow or with a large pith; petioles 1.5–3 mm. long, 4–7 mm. thick; blades 1.5–3 dm. long, 1–1.5 dm. broad, ovate to oval, inequilateral, especially the subcordate base, short-pointed and acute at the summit, entire, very thick, paler underneath, the coarse, weak venation little projecting on either side; cymes short-peduncled, dichotomous, 1 dm. or more broad, open but the branchlets densely flowered; pedicels 5–7 mm. long, very stout; calyx about 4 mm. broad, 2–3 mm. long, crateriform, subtruncate with sinuately 5-lobed margin; corolla (purple or violet) 2.5 cm. broad when expanded, deeply lobed; anthers drying blackish, 7 mm. long, narrowly lanceolate, slightly incurved above, the small pores looking upward and slightly inward; fruit not seen. (*No. 2256.*)

The same as *Mandon 420.*

Solanum rosulatum sp. nov.

Shrubby; gray with rather dense stellate indumentum, the upper leaf-surfaces somewhat strigose; branches stout, flexuous, widely branching, densely leafy at the ends; petioles 0.5–1 cm. long, broad, margined; blades 3–5 cm. long, 1.5–2 cm. broad, lance-ovate, rounded at the base, regularly acuminate and acute, thickish but flaccid, the venation weak and obscure; peduncles 1.5–2 cm. long, stoutish; cymes dichotomous, 5–6 cm. broad, about 20-flowered; pedicels 5–8 mm. long, slender, sharply deflexed; calyx 4 mm. long, lobed about midway, the lobes ovate, acute; corolla violet, 6–7 mm. long, stellate-tomentose; anthers bright-yellow, 4 mm. long, slightly broadened at the summit, the large pores looking almost directly inward; style stout, strongly curved, much longer than the anthers, the stigma little broader, elongated; fruit (dark-red?), about 1 cm. in diameter. (*No. 2518.*)

Solanum symmetrifolium sp. nov.

Grayish with a fine stellate pubescence; stems herbaceous, the branches widely divaricate-spreading and apparently reclining; petioles about 5 mm. long, margined; blades 3–10 cm. long, 1–4 cm. broad, ovate, the base abruptly contracted into the short tapering petiole, obtuse at the apex, entire, thin and flaccid, the venation coarse and weak; peduncles about 1 cm. long, forking into two sub-divaricate and nearly equal branches; pedicels loosely arranged, mostly 5–7 mm. long, slender; calyx herbaceous, 3–4 mm. long (slightly enlarging in fruit), lobed about half way, the lobes ovate, obtuse; corolla (white or violet) 5 mm. long, deeply lobed; anthers bright-yellow, nearly 5 mm. long, lance-oblong, the large, elongated pores looking inward; style very slender, little exceeding the stamens, the stigma small, elongated; fruit apparently greenish or light-red, globular, about 5 mm. in diameter. (*No. 2870.*)

The same as *Mandon 396.* Species near *S. filiforme.*

Solanum stipuloideum sp. nov.

Sparsely and very shortly stellate on the lower leaf-surfaces and calyx; a low diffuse or reclining herb; branches very slender, flexuous, angled, pale; petioles 0.5–3 cm. long, mostly with one or two small stipuloid leaves at the base; blades 2–4 cm. long, 1–3 cm. broad, ovate, truncate to slightly cordate at the base, short-acuminate and obtuse at the apex, entire or obscurely sinuate-dentate, very thin and flaccid, dark-green above, pale underneath, the weak venation coarse and irregular; pedicels mostly solitary, 1–3 cm. long, filiform; calyx 5 mm. long, the turbinate tube very short, the herbaceous lobes lance-ovate, obtuse; corolla white, nearly 1.5 cm. long, not deeply lobed, the lobes acutish; anthers bright-yellow, 5 mm. long, broadly oblong, straight, the small pores looking inward and slightly laterally; style 2–3 mm. longer than stamens, the stigma broad. (*No. 2509.*)

Species near *S. boerhaavifolium* but not having its stem or calyx.

Solanum poecilochromifolium sp. nov.

Finely gray-puberulent throughout, except the fruit, the stems shrubby; branchlets numerous, erect, rather slender, densely leafy; petioles 3–4 mm. long, stout, margined; blades 1.5–3 cm. long, 0.7–1.5 cm. broad, ovate, the rounded base abruptly narrowed into the petiole, obtuse, entire, bright-green, thin, the venation coarse but weak, rather prominent both sides; cymes terminal, stoutly peduncled, appearing racemose, about 5–10 flowered, the flowers bright-blue; pedicels slender, 1 cm. or less long; calyx-tube turbinate, about 2 mm. long, the lobes herbaceous, weak, nearly as long, ovate, obtuse; corolla 1.5 cm. broad, thin, reflexed, shallowly lobed; anthers bright-yellow, 4 mm. long, linear or slightly broadened upward, the large, elongated pores looking inward; fruit (immature) sub-globular, smooth, 7 mm. in diameter. (*No. 2515.*)

Solanum (?) bassoviicarpum sp. nov.

Unarmed (?), scurfy throughout, except the corolla and the mature fruit; shrubby, the branchlets rather short, stout, flexuous; petioles 1–1.5 cm. long, stoutish, narrowly channeled above, like the midrib; blades 5–10 cm. long, 2–6 cm. broad, ovate to oval, mostly rounded at the base, short-acuminate and acute at the apex, entire or obscurely sinuate at the margin, thick and rigid, yellowish-green, rough on both surfaces, the venation lightly impressed above, very prominent and strongly reticulate underneath, the 10–12 pairs of secondaries strongly upcurved and communicating close to the margin; flowers fascicled, fascicles about 5–7-flowered; pedicels 1–2 cm. long, thickened and lightly angled above; calyx 5 mm. broad, lobed nearly to the base, the lobes broadly ovate, obtuse or obtusish, recurved, thick; corolla nearly 1.5 cm. broad when fully expanded, lobed nearly to the base, thick, apparently violet, the lobes oval, obtuse; stamens 5 mm. long, oval, truncate, strongly

outwardly curved at the middle, the pores very large, looking inward and laterally; style short; fruit broadly ovoid and pointed when immature, nearly globular and more than 1 cm. broad when mature, dark-red. (*No. 2524.*)

The same as *Pearce's* (from Pinta?), 11,000 to 12,000 ft.

It is with reluctance that I class this plant as a *Solanum.* In habit, inflorescence-characters, calyx and fruit it appears to be a *Bassovia*, but its anthers are connivent and have very conspicuous pores.

Solanum dianthum sp. nov.

Younger portions and leaves sparsely strigose; stems herbaceous, reclining, slender, the branchlets ascending, mostly 1–2 dm. long; petioles 3–8 mm. long, rather broad; blades 2–5 cm. long, 0.7–.15 cm. broad, regularly ovate to ovate-lanceolate, the rounded base abruptly produced into the petiole, acuminate and acute at the apex, entire, thin, bright-green, or yellowish-green underneath, where the slender venation is lightly prominent; cymes mostly 2-flowered, the pedicels slender and weak, 0.7–1.5 cm. long; calyx about 6 mm. long and broad, campanulate, green, densely pilose, lobed two fifths of the way, the lobes erect, triangular, slightly longer than broad, acute; corolla bluish-white, very thin, about 1 cm. long; anthers yellow, 4 mm. long, 1.5 mm. broad, lance-oblong, blunt or truncate, the large pores looking inward, upward and a little laterally; style 1.5 mm. longer than the anthers; fruit globose, slightly depressed, nearly 1 cm. in diameter, apparently green and glabrous at maturity.

"Climbing a few feet, the flowers bluish white; scarce in wet mould." Unduavi, September, 1894. (*No. 2492.*) Near *S. boerhaavifolium* and *S. cyathicalyx.*

Solanum sarachioides sp. nov.

Stellate pubescence sparse, except on the youngest portions; branches elongated, slender, herbaceous, sparsely leafy; petioles 1–2 cm. long; blades 6–9 cm. long, 4–5 cm. broad, ovate, short-pointed and acute, the broad rounded base abruptly produced into the margined petiole, entire, very thin, dark-green; peduncles elongated, slender, appearing lateral from the internode; cymes few-(those seen 4- or 5-) flowered; pedicels slender, weak, 1–1.5 cm. long; calyx herbaceous, 4c m. long, lobed more than half-way, the lobes ovate, obtuse; corolla blue or violet, nearly 1.5 cm. broad, the lobes reflexed; anthers yellow, 4 mm. long, 1.5 mm. broad, elliptical-oblong, the large pores looking inward and laterally; fruit not seen. (*No. 2517.*)

Solanum carnosipes sp. nov.

Branches stout, fleshy, and like the petioles, peduncles, pedicels and calyx, coarsely white granular-scabrous; petioles very thick,

fleshy, 4–6 cm. long, a small elliptical stipule-like leaf, 1.5 cm. long, 1 cm. broad, at the base; blades 1–2.5 dm. long, 0.8–1.5 dm. wide, oval, rounded at the base, short-pointed and obtuse at the summit, entire, thin, underneath gray and densely short stellate-tomentose, slightly harsh, above yellowish-green, stellate-scabrous, the venation slightly impressed; peduncles elongated, very stout, the rachis strongly dilated at the branches; cyme 1–2 dm. or more broad; pedicels very stout, nearly 1 cm. long in flower; calyx 3 mm. long, 6 mm. broad, the tube nearly hemispherical, the lobes a little more than 1 mm. long, triangular-ovate, acute, broader than long, thick and rigid; corolla-bud nearly globose, 6 mm. in diameter; corolla stellate-tomentose, apparently white, 1.5–2 cm. broad; anthers yellow, 4 mm. long, oblong, the apex slightly incurved, the large pores looking directly inward; style slightly exceeding the stamens, the stigma elongated, inequilateral; fruit not seen. (*No. 2932.*)

Probably the same as *no. 259* and *Mandon 423*. Species near *S. auriculatum.*

Solanum brevipedunculatum sp. nov.

Glabrous, the branches elongated, herbaceous, rather stout but weak; petioles 3–4 cm. long, stout, margined and channeled; blades 1–3 dm. long, 0.6–1.2 dm. broad, ovate, the base rounded or abruptly produced into the petiole, acute at the apex, entire, very thin, deep-green, the midrib channeled above, prominent below, like the 12–14 very slender secondaries; peduncle short, slender, the rachis secund-flowered, subcircinate, compoundly racemose-flowered; pedicels 1–2 cm. long, slender, articulated to a nodular base; calyx 4–5 mm. broad, truncate with a lightly sinuate margin; corolla-bud oval with rounded apex, the (white?) corolla lobed nearly to the base, the lobes nearly 1 cm. long, 4 mm. broad, ovate, obtuse; anthers yellow, 6 mm. long, oblong, straight, the large elongated pores looking inward and a little upward; fruit not seen. (*No. 2525.*)

The species is peculiar in its inflorescence and calyx, which, with the habit, are those of *Cyphomandra*, while it lacks the thickened connective of that genus.

? Solanum sp. (*No. 2522.*) Flowers are lacking.

Cyphomandra betacea (Cav.) Sendt. Flora **28**: 172. 1845. (*Solanum betaceum* Cav. Anal. Hist. Nat. **1**: 44. 1799. — Ic. **6**: 15. *pl. 524.*) (Specimen without number.) Apparently the same as *no. 2337*, of which Mr. Bang says, "A shrub, 8–10 ft. high, growing in wet forest mould, the flowers white. The fruits are as in *2281* [*C. acuminata* Rusby], but the leaves and flowers are very different. Called 'Lima tomato.'" Calapampa, July 11, 1894.

CYPHOMANDRA FRAXINELLA Sendt. in Mart. Flor. Bras. **10**: 122. (*No. 2248.*) The same as *Rusby 800.*

CYPHOMANDRA ACUMINATA Rusby, Bull. Torrey Club **25**: 196. (*No. 2281*).

VASSOBIA gen. nov.

Calyx small, the tube short-turbinate, the limb crateriform, lightly and unequally lobed; corolla valvate, broadly campanulate, apparently viscid; stamens 5 (occasionally 6), included, adherent to the base of the corolla-tube, one higher than the others, the filaments much shorter than the anthers, dilated at the base, the anthers oblong, straight, their cells parallel, without pores, dehiscing completely, the connective not thickened in the back; disk obscure, fleshy, adherent to the base of the ovary, which is glabrous and 2-celled; style stout, at first declined and sigmoid, at length nearly straight, thickened toward the summit, the stigma lightly and unequally 2-lobed; fruit not seen.

A large herb (?) with simple, membranaceous, flaccid leaves and lax, terminal clusters of cymes which elongate by the successive evolution of the branches of one side. The rachis is nodose by the prominent scars of fallen flowers.

This plant has cymes which much resemble those of *Cyphomandra*, but want the thickened connective of that genus. From *Solanum*, it is excluded by the absence of anther-pores. Its flowers are nearly those of *Poecilochroma*, but the habit, and especially the foliage and inflorescence, are totally different.

Vassobia atropoides sp. nov.

Finely viscid-pubescent, the branchlets slender and, like the foliage and inflorescence, widely spreading; petioles 5–10 or more cm. long; blades 10–25 cm. long, 7–18 cm. broad, obtuse or acutish, at the base acute, thin, drying brownish; cyme compound, the peduncles of its principal branches 5–8 cm. long; pedicels 1.25–2.5 cm. long, dilated toward the summit, fleshy; calyx about 4–5 mm. broad, the rounded lobes short and very broad; corolla deep blue-purple, about 1 cm. long, campanulate, divided one third of the way to the base; stamens nearly equaling the tube of the corolla; anthers 3 mm. long, straight, oval, yellow, on very short filaments; fruit not seen. (*No. 2615.*)

PHYSALIS BARBADENSIS Jacq. Misc. **2**: 359. (Specimen without number.) The same as *Jenman 5086* and *Bernoulli 175* from Guatemala.

PHYSALIS PERUVIANA L. Sp. Pl. ed. 2. 1670. (*No. 1783.*)

PHYSALIS SURINAMENSIS G. Miquel, Linnaea **17**: 741. 1844. (Specimen without number.) The same as *Hostmann & Kappler's* type.

Physalis Rydbergii sp. nov.

Younger portions, and especially the calyx, hispid with branched white hairs; stems stout, but weak, widely branched, the branches slender; petioles 1–2 cm. long, slender; blades 2–6 cm. long, 1–3 cm. broad, ovate, inequilateral, especially at the broad base, acuminate and acute at the apex, coarsely and irregularly dentate, very thin and flaccid, bright-green, the venation slender, very prominent underneath, the principal secondaries about 5 on one side, 4 on the other, the lowermost with a stout basal branch; pedicels 3 mm. long, little elongating in fruit; calyx, in flower 5 mm., in fruit 1.7 cm. long, ovate, acute; corolla 7 mm. long, very pale, the base loosely enclosed in the calyx. (*No. 2520.*)

Species near *P. minima*, but differing in the indumentum. *Palmer 472* from Guadalajara, Mexico, appears to be a more hispid form of this species, while *Müller 1855* from Veracruz is possibly a smooth form.

BASSOVIA ANCEPS (R. & P.) Rusby, Bull. Torrey Club **26**: 197. 1899. (*Nos. 2513* and *2526.*)

BRACHISTUS LASIOPHYLLUS (Dunal) Rusby, Bull. Torrey Club **26**: 198. 1899. (*No. 2617.*)

Brachistus fasciculatus sp. nov.

Softly gray-tomentose with stellate hairs; branches slender, woody, terete; petioles 2–3 cm. long, narrow, lightly channeled; blades 7–14 cm. long, 3–5 cm. broad, oblong-ovate, acute at the base, regularly acuminate and acute at the apex, entire, thin and flaccid, deep-green above, gray underneath, the venation very slender, reticulate, lightly prominent both sides; pedicels fascicled, 2–3 cm. long, very slender, gradually thickened upward; calyx-tube 2–3 mm. long, 4 mm. broad, the 10 teeth filiform, 4–5 mm. long; corolla white, 1–1.5 cm. long, shallowly lobed; fruit not seen. (*No. 2871.*)

The same as *Mandon 411* and *412*.

Poecilochroma macrophylla sp. nov.

Branches elongated, stout, terete, roughened with slender, curved, corky excrescences; petioles 1–2 cm. long, narrow considering the size of leaf, channeled above; blades 0.7–1.5 dm. long, 3–6 cm. broad, ovate, oval, or some obovate, acute at the base, mostly obtuse at the apex, entire, bright-green, glabrous, but strongly and finely wrinkled in drying, thickish, midrib channeled above, venation lightly prominent underneath, secondaries about 7 pairs, intercon-

necting about one third of the way from the margin to the midrib; flowers densely fascicled; pedicels 2.5–5 cm. long, slender, thickened upward, much wrinkled in drying; calyx 5 mm. long, 7 mm. broad, 5-lobed, the lobes nearly semicircular, lightly costate, minutely apiculate; corolla (apparently yellowish-white with a darker center) 2.5 cm. long, very broadly campanulate, lightly stellate; filaments slightly unequal, filiform, about 1.5 cm. long; anthers 4 mm. long, broadly oblong, lightly curved; fruit not seen.

"A shrub, 8 ft. high, with yellowish-white flowers, growing in wet forest mould." Unduavi, September, 1894. (*No. 2482.*)

Poecilochroma venosa sp. nov.

Densely branching, the branchlets thick but weak, terete, recurved-spreading, densely roughened with fine corky excrescences, rich-brown, densely leafy; petioles 1–3 mm. long, broad, margined; blades 2.5–4 cm. long, 1–2 cm. broad, oval-ovate, subrotate at the base, obtuse at the apex, entire, deep-green, thickish, glabrous, shining, the fine venation strongly impressed above, prominent below, where the wrinkles occur in peculiar wave-like forms; calyx 5–6 mm. long, nearly 1 cm. broad, nearly hemispherical, green, the lobes nearly semicircular, stoutly apiculate; corolla 2.5 cm. long, very broadly campanulate, shallowly lobed, lightly 10-nerved, apparently yellowish-blue, stellate-tomentose; filaments 2 cm. long; anthers 5 mm. long, ovate, curved, thick, yellowish with blue margins; fruit not seen. (*No. 2007.*)

The same as *Lechler 2080* from Peru, and perhaps the same as *Mandon 441:* also collected by *Pearce.*

Poecilochroma brevifolia sp. nov.

Branches stout, terete, ascending or erect, blackish-brown, finely roughened with corky excrescences; petioles 0.5–1 cm. long, channeled above; blades 2–3 cm. long, 1–2 cm. broad, ovate, with rounded base and very blunt summit, entire, slightly thickened, yellowish-green, glabrous, finely wrinkled, the midrib channeled above, with the venation slightly impressed, the latter prominent underneath with a broad midrib, the secondaries about 5 pairs; pedicels few at the ends of the very short branchlets, about 2 cm. long, filiform, little thickened upward; calyx 7–8 mm. long and broad, turbinate, the lobes 4 mm. long, 3 mm. broad, ovate, blunt, minutely apiculate; corolla nearly 3 cm. long, broadly campanulate, shallowly lobed, minutely and sparsely stellate-hairy, yellowish-blue; filaments 1.5 cm. long; anthers 4 mm. long, ovate, blunt, bluish; fruit not seen. (*No. 2938.*)

Apparently the same as *no. 725.* Species very near the last, but the longer petioles with shorter leaves, different calyx-lobes and branchlets, mark it as distinct.

NICANDRA PHYSALOIDES Gaertn. Fruct. 2: 237. *pl. 131. f. 2.* "Five to seven feet high, in cultivated ground, the flowers blue; scarce." Coripata, March 2, 1894. (*No. 2072.*)

DATURA STRAMONIUM L. Sp. Pl. 179. Abundant at Coripata. (*No. 2137.*)

DATURA TATULA L. Sp. Pl. ed. 2. 256. "A small plant, 5–8 ft. high, the flowers blue, open only at night; abundant." Coripata, April 18, 1894. (*No. 2136.*)

BRUGMANSIA SANGUINEA (R. & P.) D. Don, in Sweet, Brit. Flow. Gard. II. *pl. 272.* (*Datura sanguinea* R. & P. Fl. Per. 2: 15.) (*No. 1942.*)

BRUGMANSIA ARBOREA (L.) Steud. Nom. ed. 2. 1: 230. (*Datura arborea* L. Sp. Pl. 179.) (*No. 1943.*)

CESTRUM MATHEWSII Dunal, in DC. Prodr. 13[1]: 637. (*No. 2872.*) The same as *no. 157*, published as *C. Parqui.*

CESTRUM CORIACEUM Miers, Lond. Jour. Bot. 5: 161. 1846. "A shrub about 10 ft. high, in wet clay along roadsides, the flowers yellow; scarce." Coroico, September, 1894. (*No. 2465.*)

CESTRUM sp., related to the last, but probably undescribed. (*No. 1825.*)

Cestrum Mandoni sp. nov.

Glabrous; branches elongated, slender, erect, densely leafy, the internodes about 1 cm. long; small falcately oval leaves at the base of the petioles nearly 1 cm. long; petioles about 5 mm. long, broad, margined; blades 5–8 cm. long, 1.5–2.5 cm. broad, lance-oblong, obtuse or somewhat rounded at the base, acute at the apex, entire, rather thin, bright-green, the venation lightly prominent underneath, the slender secondaries about 12 pairs, strongly up-curved; peduncles solitary in the upper axils, stoutish, about 5 mm. long, densely flowered at the summit; pedicels scarcely any; calyx 5 mm. loug, cylindraceous-campanulate, or slightly contracted at the mouth, the lobes 2 mm. long, ovate, acuminate; corolla 2.5 cm. long, the tube slenderly funnelform, 4 mm. broad at the summit, the lobes acute in the bud, 4.5 mm. long; stamens and style reaching the mouth of the corolla, the anthers 1 mm. long and nearly as broad; stigma greenish, nearly 1 mm. broad; fruit not seen. (*No. 2510.*)

The same as *Mandon 452*, which has gone under the name of *C. Parqui.*

Cestrum impressum sp. nov.

Densely stellate and scurfy-tomentose, the upper leaf-surfaces sparsely so, the fruit glabrous; branches elongated, spreading,

flexuous, densely leafy; petioles 4–5 mm. long, very stout; blades 0.5–1 dm. long, 2–5 cm. broad, ovate, rounded at the base, acute at the apex, thick, pale-green above with the reticulate venation strongly impressed, yellowish underneath, with the venation lightly prominent; peduncles short and stout, pedicels scarcely any; flowers not seen; fruiting calyx 7 mm. broad, lobed nearly half way, lightly costate, the lobes ovate, obtuse, closely investing the fruit, which is blackish, ovoid, rounded at the summit, nearly 1 cm. long. (*No. 2516.*)

Cestrum suaveolens sp. nov.

Densely yellowish-gray soft-tomentose; branches elongated, stoutish, erect, flexuous; petioles 1–1.5 cm. long, stoutish; blades 3–6 cm. long, 1–3 cm. broad, ovate, rounded or lightly cordate at the base, blunt at the summit, entire, thick, finely reticulate, the venation strongly impressed above, prominent underneath; panicles terminal, leafy; peduncles of the cymes 0.5–1 cm. long, stout, terete; cymes about 2 cm. broad; pedicels proper scarcely any; calyx 6 mm. long, 3 mm. broad, campanulate, the lobes nearly 3 mm. long, triangular-ovate, acutish; corolla (yellowish and densely tomentose) nearly 1.5 cm. long, the tube regularly infundibular, 4 mm. broad at the summit, the lobes 3 mm. long, triangular-ovate; anthers less than 1 mm. long, fully as broad, like the style reaching the mouth of the corolla; stigma greenish, nearly 1 mm. broad. (*No. 2512.*)

The same as *Mandon 451.*

NICOTIANA UNDULATA R. & P. Fl. Per. 2: 16. (*No. 1858.*)

NICOTIANA TOMENTOSA R. & P. Flor. Per. 2: 16. "A tree 15–25 ft. high, growing in good wet mould, the flowers yellowish-white; scarce." Coroico, September 13, 1894. (*Nos. 2408* and *2614.*) The same as *Rusby 2435.*

NIEREMBERGIA PULCHELLA Gill.; Miers, Lond. Jour. Bot. 5: 173. 1846. (Specimen without number.)

BRUNFELSIA HYDRANGEAEFORMIS (Pohl) Benth. in DC. Prodr. 10: 108. "Grows in shaded mud; scarce." Uchimachi, July 20, 1894. (*No. 2352.*)

Schwenckia Mandoni sp. nov.

Finely pubescent with spreading hairs; stem a meter or more high, much-branched, the branches elongated, slender, erect; petioles 0.5–1 cm. long, slender; blades 2–7 cm. long, 1–3.5 cm. broad, ovate, lightly cordate at the base, acute, thin but rigid, pale or grayish-green, entire, the venation slender, rather prominent underneath; inflorescence very loosely paniculate, the branches sub-filiform, elongated, recurved-spreading, linear-bracted; pedicels from almost none to 7 mm. long, slender; calyx 3.5 mm. long, lobed

about one-third of the way, the tube campanulate with five prominent bluish-green angles, the lobes triangular, acute, the sinuses ovate, rounded; corolla blue, loosely enclosed in the calyx, 4.5 mm. long, the cylindraceous tube nearly twice the length of the limb, the bud acuminate and acute.

"Abundant in dry, gravelly soil; the flowers green." Coripata, Yungas, March 22, 1894. (*No. 2097.*) The same as *Mandon 449.*

SCROPHULARIACEAE

FAGELIA BANGII Rusby Mem. Torrey Club **4**: 236. (*No. 1918.*) The same as *no. 83a.*

FAGELIA BARTSIIFOLIA (Wedd.) Rusby, Mem. Torrey Club **4**: 236. (Specimen without number.)

FAGELIA MELISSIFOLIA (Benth.) Kuntze, Rev. Gen. Pl. 460. (*Calceolaria melissifolia* Benth. in DC. Prodr. **15**: 214.) One or two specimens were sent under the number *83*, and may be called *83b.*

MIMULUS GLABRATUS H.B.K. Nov. Gen. **2**: 370. (*No. 1876.*)

LIMOSELLA AQUATICA L. Sp. Pl. 631. (*Nos. 1968* and *2606.*)

SCOPARIA DULCIS L. Sp. Pl. 116. (*Nos. 2616* and *2851.*)

OURISIA CHAMAEDRIFOLIA Benth. in DC. Prodr. **10**: 493. (Specimen without number.)

VERONICA PEREGRINA L. Sp. Pl. 14. (*No. 2852.*)

BUCHNERA ELONGATA Sw. Fl. Ind. Occ. **2**: 1061. Guanai, 2,000 ft., 1886. (*No. 1363.*)

? GERARDIA RIGIDA Gill.; Benth. in Hook. Comp. Bot. Mag. **1**: 206. 1835. (*Nos. 2530* and *2854.*) The Bolivian species of *Gerardia* are extremely difficult, as the material and information accumulated up to the present does not allow us to decide whether there are many species, or a few which are very variable.

GERARDIA LANCEOLATA (R. & P.) Benth, in Hook. Comp. Bot. Mag. **1**: 207. 1835. (*No. 2529.*)

Gerardia ovatifolia sp. nov. (*G. lanceolata parvifolia* Benth. in DC. Prodr. **10**: 516; but there is a *G. parvifolia* Chapm.) Vic. Cochabamba, 1891. (*No. 2029.*) The same as *Rusby 1081*, and one collected in Lima marked in Herb. Kew. "ex herb. R. & P."

CASTILLEIA FISSIFOLIA L. f. Suppl. 293. (Specimen without number.)

BARTSIA PATENS Benth. in DC. Prodr. **10**: 546. (*No. 2028.*) The same as *Rusby 1090.*

BARTSIA HISPIDA Benth. in DC. Prodr. **10**: 547. Vic. Cochabamba. (*No. 2030.*) *No. 2031* is apparently a small form of the same species, and is the same as *Mandon 481.*

LENTIBULACEAE

UTRICULARIA ALPINA Jacq. Enum. Pl. Carib. 11. (*U. montana* Jacq. Select. Am. 7. *pl. 6.*) (Specimen without number.)

UTRICULARIA sp., apparently undescribed, but the specimens lack corollas. (*No. 2223.*)

GESNERIACEAE

ACHIMENES HEPPIELOIDES Fritsch, Bull. Torrey Club **23**: 151. 1896. (Specimen without number.)

SEEMANNIA SYLVATICA (H.B.K.) Hanst. Linnaea **29**: 540. 1858. (Specimen without number.)

GESNERIA STACHYDIFOLIA Benth. Pl. Hartw. 230. (*No. 2613.*) The same as *no. 543.* Also collected by *Mathews* and by *Pearce* at Santa Cruz, March, 1865. Near *Gardner 4269*, but the flowers sessile and style much shorter.

ALLOPLECTUS PATRISII DC. Prodr. 7: 545. (*No. 2540.*) The same as *no. 1259.*

BESLERIA SPRUCEI Britton; Rusby, Bull. Torrey Club **27**: 31. 1900. (*Nos. 2537* and *2538.*) The same as *Rusby 2149.*

BESLERIA LONGIPEDUNCULATA Britton; Rusby, Bull. Torrey Club **27**: 69. 1900. (*No. 2539.*) The same as *Rusby 2436.*

BIGNONIACEAE

ARRABIDAEA OBOVATA DC. Prodr. **9**: 185. (*Nos. 2242* and *2534.*) The same as *Rusby 1153* and *Burchell 6630.*

BIGNONIA BRACHYPODA DC. Prodr. **9**: 145. (*No. 2855.*)

BIGNONIA CAPREOLATA L. Sp. Pl. 624. (Specimen without number.)

BIGNONIA GLUTINOSA DC. Prodr. **9**: 162. "Grows in mould, in forest-shade, beside the river, climbing 15–20 ft., the flowers light-red; scarce." Coripata, April 26, 1894. (*No. 2159.*) The same as *Rusby 1147* and *1154.*

?ADENOCALYMNA BRACTEATUM (Cham.) DC. Prodr. **9**: 200. (*No. 2535.*) Apparently the same as *Rusby 1130.*

AMPHILOPHIUM MOLLE Ch. & Sch. Linnaea **5**: 120. 1830. (*No. 2222.*)

JACARANDA ACUTIFOLIA Humb. & Bonpl. Pl. Aequin. 1: 59. *pl. 17.* (Specimen without number.)

CRESCENTIA CUJETE L. Sp. Pl. 626. (*No. 2536.*) The same as *no. 1161.*

ACANTHACEAE

RUELLIA HUMBOLDTIANA (Nees) Lindau, Bull. Herb. Boiss. 3: 366. 1895. (*No. 2664.*)

RUELLIA BANGII Rusby, Mem. Torrey Club 6: 102. (*Nos. 1354* and *2663.*) A broad-leaved form.

RUELLIA ELLIPTICA Rusby, Bull. Torrey Club 27: 74. 1900. "Common in dry ground along roadsides. Flowers very light blue." Coroico, September. (*No. 2472.*)

Ruellia Willdenoviana (Nees) Lindau. (*Stemonacanthus Willdenovianus* Nees, in DC. Prodr. 11: 207). (*No. 2055.*)

Ruellia (*Stemonacanthus*) **Pearcei** sp. nov.

Minutely grayish-puberulent; stems slender, rigid, erect-branched, quadrangular, striate; petioles 1–1.5 cm. long, channeled above, abruptly somewhat dilated at the base; blades 0.7–1 dm. long, 2–3 cm. broad, lanceolate, the base acuminate and gradually narrowed into the petiole, long-acuminate and acute at the apex; calyx-tube 2 mm. long, campanulate, the lobes 0.7–1 cm. long, linear-attenuate, 1-nerved; corolla scarlet, 5 cm. long, the tube lightly curved, infundibular, lightly ventricose above, the lobes about 7 mm. long, broad, emarginate; capsule strongly clavate, 1.5–2 cm. long, glabrous.

Vic. Cochabamba, 1891. (*No. 2056.*) The same collected in Bolivia by *Pearce.*

APHELANDRA ACUTIFOLIA Nees, in DC. Prodr. 11: 299. (*No. 2054*, p.p.)

SANCHESIA PERUVIANA (Nees) Rusby, Mem. Torrey Club 6: 102. (*No. 2367.*). "About 5 feet high, growing in wet shaded sand, near the river, the flowers rose-colored; scarce." Coroico, August 2, 1894.

BELOPERONE NUDA Rusby, Mem. Torrey Club 6: 103. (*No. 2303.*) "A small shrub in wet shaded mould, the flowers yellow; not plentiful."

Chaetochlamys Lindavii sp. nov.

Grayish-puberulent; stems slender, strict, green, obtusely quadrangular; petioles (only the upper seen) 3–5 mm. long, broad; blades 1–1.5 dm. long, 2.5–7 cm. broad, ovate, mostly inequilateral, the base abruptly produced into the petiole, acuminate and

acute at the apex, entire, very thin, pale-green, the midrib and about 4 pairs of strongly ascending slender secondaries lightly prominent both sides; bracts 2–3 cm. long, linear-oblong, acuminate, strongly 1-nerved; bractlets 3, united at the base, 2 cm. long, linear-attenuate; calyx parted to the base, the segments 1.5 cm. long, lanceolate, acuminate, 2.5 mm. broad; corolla-tube 4 cm. long, infundibular, lightly recurved; lower lip 2.5 cm. long, the lobes 1 cm. long; upper lip slightly shorter; stamens shorter than the corolla, the filaments thickish; anthers 7 mm. long, the thecae overlapping, the lower conspicuously spurred; style a little longer than the stamens, thickish, the stigma obscurely 2-lobed. (*No. 2546.*)

Justicia Rusbyana Lindau, Mem. Torrey Club 4: 243. (*No. 2544.*) The same as *no. 379.*

Justicia (*Vasica*) **robusta** sp. nov.

Softly pubescent, the principal veins long-pilose, the upper leaf-surfaces densely strigose; branchlets short, stout, sub-erect; petioles 5 mm. long, stout, pilose; blades 0.7–1.5 dm. long, 2.5–5 cm. broad, ovate, abruptly contracted to a very short point at the base, at the apex abruptly contracted into a long attenuate acumination, entire, thickish, yellowish-brown underneath, where the midrib and 10–12 pairs of very slender secondaries are lightly prominent; panicles terminal, small, dense, subsessile; bracts 3 mm. long, linear-attenuate, strongly gray-pilose; calyx 7 mm. long, parted nearly to the base, the lobes linear-attenuate, green, strongly gray-pilose; corolla-tube 5 mm. long and broad, contracted at the summit, an intruded large fold near the lobes, strongly 3-ribbed, the ribs connected by prominent nearly straight veins; lobes nearly 1.5 cm. long, the lower 3-lobed, nearly 1 cm. broad at the summit, the lobes sub-semicircular; upper lip scarcely toothed, the apex incurved; stamens nearly equaling the corolla, the anthers 3–4 mm. long, flattened, one cell appendaged with a slender, white, curved appendage; style exceeding the stamens, recurved at the summit; fruit not seen. (*No. 2404.*)

Mr. Bang says "A climber, 30 ft. high, with yellow flowers in wet forest-mould; scarce. Coroico, Sept. 2, 1894." There must be some mistake in the plant, as it does not appear to be a climber, and its flowers are of some red color.

Justicia (*Dianthera*) **subintegrifolia** sp. nov.

Glabrous; branches slender, weak and somewhat reflexed, coarsely sulcate; leaves tapering into a short channeled petiole, 0.7–1.5 dm. long, 3–4.5 cm. broad, ovate, acuminate and acute at both ends, obsoletely serrate, thin, pale-green, the midrib narrowly channeled above, prominent underneath, like the 5 or 6 irregular

pairs of very slender secondaries; spikes terminal, sessile, more or less deflexed, 3–6 cm. long; bracts 2 or 3 mm. long, ovate, acuminate; calyx 5–6 mm. long, divided nearly to the base, the lobes lanceolate, acuminate, strongly 1-ribbed; corolla nearly 1.5 cm. long, apparently yellowish, the lips about two fifths of its length, the lobes of the lower lip round-ovate, 2 mm. long, the upper lip entire; stamens 1 mm. shorter than the upper lip, the oblong anther 1.5 mm. long, the thecae slightly overlapping, without appendages; style about as long as the stamens, straight, rather stout, flattened; capsule lance-oblong, about 1 cm. long; seed 3 mm. long, 2 mm. broad, oval, compressed, obtusely 8–10-ribbed, the ribs verrucose. (*No. 2545.*)

VERBENACEAE

LANTANA TRIFOLIA L. Sp. Pl. 626. (*No. 2044.*)

LANTANA VELUTINA Mart. & Gal. Bull. Acad. Brux. 1: 325. (*Nos. 2049* and *2532.*)

LANTANA LILACINA Desf. Cat. Hort. Par. ed. 3. 392. (*No. 2533.*)

LANTANA NIVEA Vent. Jard. Malmais. 8. *pl. 8.* (*No. 2034*, as to the specimens without glandular indumentum.) I think *Morong 344*, published as *L. Camara*, is the same.

Lantana foetida sp. nov.

Heavily glandular-hairy, the hairs spreading; branches widely spreading, sharply quadrangular; petioles 0.5–1.5 cm. long, stout, narrowly margined; blades 0.4–1 dm. long, 3–7 cm. broad, ovate, very abruptly contracted into a short point at the base, or truncate or lightly cordate, very short-pointed and acute or obtusish at the apex, closely dentate, the teeth mostly obtuse, above dark-green, rugose with strongly impressed veins, underneath pale-green with the yellowish veins rather prominent, the secondaries slender, connected by the tertiaries; peduncles 0.4–1 dm. long, stout, widely spreading, finely striate; heads in flower 1.5 cm. broad, in fruit 2–2.5 cm. broad; bracts 2–4 mm. long, ovate, acute; calyx 2 mm. long, 1.5 mm. broad, cupulate-campanulate, truncate; corolla pubescent, 1 cm. long, the tube lightly sigmoid-curved, strongly ventricose about the middle, where it is 2 mm. broad; lobes spreading, 1.5 mm. long, the broadest nearly 3 mm. broad; longest stamens reaching to about the middle of the corolla-tube, the anthers nearly 1 mm. long; fruit 7 mm. long, 5 mm. broad, ovoid, rounded at the apex, black, shining. (*No. 2034*, as to the specimens with glandular pubescence.)

Lantana hyptoides sp. nov.

Short-tomentose; root stout, woody, coarsely branched; stems ascending, 6–8 dm. long in my specimens, sparsely erect-branched,

obtusely quadrangular, the internodes 3–5 cm. long; petioles about 5 mm. long, very stout; blades 2–3 cm. long, 1.5–2 cm. broad, ovate, sub-cordate at the base, rounded at the summit, strongly serrate with obtusish teeth, thick, the venation impressed above, somewhat prominent but concealed by the indumentum underneath; peduncles 3–5 cm. long, costate; heads 1–1.5 cm. broad; calyx-tube narrowly campanulate, 2 mm. long, the lobes of about equal length, narrowly spatulate, bright-purple toward the summit; corolla densely villous, the tube 3 mm. long, cylindraceous-infundibular, the longer lip 2 mm., the shorter 1 mm. long. (*No. 2541.*)

Lippia urticoides (Cham.) Steud. Nom. ed. 2. 2: 54. (*Aloysia urticoides* Cham. Linnaea 7: 238. 1832.) "A slender shrub, 10–15 ft. high, in waste ground, the flowers white." Coripata, April 27, 1894. (*No. 2165.*)

Lippia boliviana Rusby, Mem. Torrey Club 4: 243. (*No. 2531.*) The same as *no. 979.*

Bouchea pseudo-gervao (A. St. Hil.) Cham. Linnaea 7: 253. 1832. (*Verbena pseudo-gervao* A. St. Hil. Pl. Us. Bras. *pl. 40.*) (*No. 2001.*)

Bouchea incisa sp. nov.

Younger portions and the veins underneath minutely puberulent; stems stout, erect, erect-branched, terete, blackish, finely striate; petioles 0.5–1 cm. long, margined, dilated at the insertion; blades 0.5–1 dm. long, 2–4 cm. broad, ovate, at the base abruptly contracted and then tapering into the petiole, at the summit abruptly acuminate, and then tapering to an acute point, the upper half incisely serrate, thin but somewhat rigid, bright-green above, pale underneath; peduncles 3–5 cm. long, rather stout, the rachis 1–1.5 dm. long; bracts about 5 mm. long, linear-attenuate; flowers very shortly and stoutly pedicelled; calyx 1.5 cm. long, 3 mm. broad, cylindraceous, strongly angled, strongly recurved in flower, erect in fruit, the subulate, very acute teeth 2.5 mm. long and erect; corolla-tube nearly 2 cm. long, strongly recurved, the limb broad, strongly ringent; fruit 1.5 cm. long, lance-oblong, the calyx exceeding it in a twisted form. (*No. 2226.*)

Valerianodes cayennense (Vahl) Kuntze, Rev. Gen. Pl. 510. (*Stachytarpheta cayennensis* Vahl, Enum. 1: 208.)

Citharexylum ilicifolium H.B.K. Nov. Gen. 2: 256. (*No. 1917.*)

? Duranta Plumieri Jacq. Select. Am. 186. (*No. 1798.*) The same form collected by *Pearce.*

Duranta Lorentzii Griseb. Goett. Abh. 24: 280. 1879. "A small tree, growing in rocky, wet places." Coripata, April 29, 1894. (*No. 2172.*)

Duranta Pearcei sp. nov.

A shrub with slender ascending branchlets; branchlets, inflorescence and lower leaf-surfaces ferruginous-velvety, the upper leaf-surfaces sparsely puberulent; internodes about 12 mm. long; petioles 3–4 mm. long, stout; blades 4–6 cm. long, 2–3 cm. wide, oblong-ovate, rounded or lightly cordate at the base, acute, entire, thick, the principal secondaries about 8–10 on each side, connecting near the margin, the stout midrib and venation lightly prominent underneath; panicles terminal, pyramidal; flowers not seen; fruiting peduncles 2 mm. long, very slender, somewhat thickened upward; calyx persistent after the fall of the fruit as a thick, circular, black, disk-like body 0.5 mm. broad, the lobes obscure, semicircular; fruit 12 mm. long, 4–5 mm. broad, pyriform with slenderly tapering base and rounded summit, minutely ferruginous.

"About 3 m. high, in dry gravelly soil." Near Coroico, Yungas. (*No. 2406*, but distributed as *2806*.) Also collected by *Pearce* at Callican, 8,000 to 9,000 ft.

LABIATAE

Ocimum micranthum Willd. Enum. Hort. Berol. 630. (*No. 2542*.)

Mesosphaerum brevipes (Poit.) Kuntze, Rev. Gen. Pl. 525. (*Hyptis brevipes* Poit. Ann. Mus. Par. **7**: 465. 1806. (*No. 2612*.)

Mesosphaerum pallidum sp. nov.

Finely strigose; branches slender, erect, elongated, reddish-gray, obtusely quadrangular and striate, the internodes 5–8 cm. long; petioles 0.5–1 cm. long, consisting of the narrowed leaf-base; blades 4–8 cm. long, 1–3 cm. broad, obovate, rather abruptly contracted into the narrow base, obtusish to blunt at the apex, coarsely serrate with obtusish teeth, pale-green, thick, the venation lightly prominent above, more so underneath, the secondaries about 7 pairs, strongly incurved, connecting near the margin; peduncles 2–3 mm. long, stout; heads spherical, nearly 1 cm. broad; outer bracts 3 mm. long, 1.5 mm. broad, ovate, blunt, long-pilose; calyx pilose, 1.5 mm. long, lobed about half-way, the tube turbinate, dark, the pale-green lobes lance-oblong, obtuse, the apices lightly inflexed; corolla-tube 2 mm. long, lightly sigmoid-curved, the oblique mouth nearly 2 mm. broad; two lobes of the upper lip about twice as large as the lateral, which are connected with the lower to form the anterior lip; lower lobe twice the length of the others, narrow, substipitate, containing the rather large anthers; nutlets nearly 1 mm. long, obovoid, the apex rounded, deep-brown, minutely rugose, slightly shining.

"In muddy places where water is running. Plant about 4 ft. high, the flowers greenish-white." Calapampa, July 9, 1894. (*No. 2330.*)

Species peculiar for the short, blunt, green calyx-lobes. In this respect it is like *M. membranaceum* (Benth.) Kuntze. The corolla is exactly that of *Eriope*, but in all other respects the characters are distinct therefrom.

BYSTROPOGON CANUS Benth. Lab. 326. (*No. 2043.*)

MICROMERIA BOLIVIANA Benth. Lab. 731. (Specimen without number.)

ALGUELAGUM TENUIFLORUM (Benth.) Kuntze, Rev. Gen. Pl. 512. (*No. 1835.*) The same as *no. 167.*

Alguelagum lancifolium sp. nov.

Branchlets obtusely quadrangular, purplish, the younger portions, like the petioles, peduncles, etc., more or less scurfy; petioles 1–1.5 cm. long, stout, channeled above, 5-striate underneath; blades 0.8–1.2 dm. long, 2.5–4 cm. broad, lanceolate, rounded or blunt at the base, acutish at the apex, finely and obtusely or crenately dentate, thickish, bright-green, strongly rugose and lightly scabrous, minutely golden-dotted, the midrib and 15–20 pairs of secondaries impressed above, very prominent underneath, the latter connecting close to the margin; panicles widely variable in size, leafy-bracted; flowers mostly short-pedicelled; calyx-tube campanulate, in flower 5 mm. long, 4 mm. broad, the lobes somewhat longer, attenuate and pungent; corolla about 1 cm. long. (*No. 1823.*)

Apparently the same species was collected by Triana in New Grenada. Species very near *A. salviifolium* Rusby.

SALVIA BANGII Rusby, Mem. Torrey Club **4**: 246. (*No. 2543.*) The same as *no. 980.*

? SALVIA CARDIOPHYLLA Benth, Lab. 721. (*No. 2032.*) Flowers are required for a positive determination. The same as *Holton 478.*

? SALVIA BRIDGESII Britton, Bull. Torrey Club **27**: 124. Vic. Cochabamba, 1891. (*No. 2033.*) In these specimens the ovate, thin leaves reach a length of 1.25 dm. and a breadth of 3.5 cm. The calyx is 1–1.5 cm. long, and the corolla 3.5 cm. long and very stout.

PLANTAGINACEAE

PLANTAGO PSYLLIUM L. Sp. Pl. 115. (*No. 1965.*)

NYCTAGINACEAE

BOUGAINVILLEA MODESTA Heimerl, Denks. Math.-Nat. Akad. Wiss. Wien **70**: 118. 1900. (*No. 2398.*) "A very stout tree, 80 ft. high, scarce in slaty soil near river, the flowers dark green-brown." Near Coroico, August 24, 1894.

COLIGNONIA GLOMERATA BOLIVIANA Heimerl, Denks. Math.-Nat. Akad. Wiss. Wien **70**: 136. 1900. (*No. 1772.*)

PISONIA HIRTELLA H.B.K. Nov. Gen. **2**: 217. (*No. 1809.*)

Neea Bangii sp. nov.

Branches gray, strongly wrinkled in drying; younger portions and lower leaf-surfaces minutely puberulent, the upper leaf-surfaces slightly shining; branches stoutish, striate; petioles 3–8 mm. long, stout and broad; blades 0.5–1.5 dm. long, 2.5–5 cm. broad, obovate, mostly acute at the base, abruptly acuminate and obtusish at the apex, entire, the venation very slender, inconspicuous both sides, the secondaries very irregular, communicating near the margin; pistillate flowers only seen; peduncles 3–5 cm. long, very slender, recurved or pendulous, thickening in fruit; panicles 2–4 cm. broad, loosely-flowered, the bracts triangular-subulate, about 1 mm. long; flowers yellowish, the tube campanulate, the mouth open, 2.5 mm. long, the lobes 1.5 mm. long, recurved; pistil lightly exserted, the stigma penicillate; fruit black, nearly 1.5 cm. long, half as broad, oval, tipped by the short, persistent perianth-limb.

"A tree 15 to 20 ft. high, with yellow flowers, scarce in rich, wet forest-mould." At the foot of Mt. Uchimachi, Calapampa, July 17, 1894. (*No. 2346.*) Closely resembling *N. longipedunculata* Britton, but the flowers entirely unlike.

ILLECEBRACEAE

PARONYCHIA CHILENSIS DC. Prodr. **3**: 370. (*No. 1970.*)

AMARANTACEAE

HEBANTHE HOLOSERICEA Mart. Flora **21**: Beibl. 65. (*No. 2264.*)

IRESINE CELOSIOIDES L. Sp. Pl. 1456. (*No. 2355.*)

IRESINE PANICULATA (L.) Kuntze, Rev. Gen. Pl. 542. (*No. 2469.*)

CHAMISSOA ALTISSIMA (Swartz) Kunth; H.B.K. Nov. Gen. **2**: 197. *pl. 125.* (*No. 2263.*)

ALTERNANTHERA PHILOXEROIDES Griseb. Goett. Abhand. **24**: 36. (*No. 2359.*)

CHENOPODIACEAE

CHENOPODIUM BOLIVIANUM Murr, Magyar Bot. Lap. 1: 359. 1902. (*No. 2897.*)

PHYTOLACCACEAE

RIVINA LAEVIS L. Mant. 1: 41. "A shrub, 4 to 5 ft. high, growing in dry gravelly soil; the flowers white, the fruit bright-red; scarce." Coripata, March 10, 1894. (*No. 2083.*)

Villamilla rivinioides sp. nov.

Finely tomentellate; branches slender, weak, ascending, densely leafy; stipules attenuate, 3–5 mm. long; petioles 1–3 cm. long, striate, weak; blades 0.7–1.5 dm. long, 3–5 cm. broad, ovate, obtuse at the base, acuminate and acute at the apex, entire, very thin, the narrowly margined midrib and 8–10 pairs of strongly upcurved secondaries whitish and lightly prominent underneath; peduncles 4–6 cm. long, flower-bearing portion 1.5 dm. or more long, strongly striate, densely flowered, the raceme about 1.5 cm. broad; bracts setiform, 1 mm. long; pedicels 3–5 mm. long, very slender, spreading; sepals 3 mm. long, nearly 2 mm. broad, elliptical, hyaline, strongly 3-ribbed, the midrib enlarged toward the summit into a reddish keel; filaments 2 mm. long, white, slender; anthers 1.5 mm. long, 0.5 mm. broad, the thecae separated except at the middle; ovary 1.5 mm. long, 1 mm. broad, strongly flattened and narrowly margined. (*No. 2607.*)

MOHLANA SECUNDA (R. & P.) Mart. Nov. Gen. 3: 172 (*Rivina secunda* R. & P. Fl. Per. 1: 65. *pl. 102, f. a.* (*No. 2550.*)

PHYTOLACCA OCTANDRA L. Sp. Pl. ed. 2. 631. (*Nos. 2548* and *2549.*)

POLYGONACEAE

POLYGONUM ACUMINATUM H.B.K. Nov. Gen. 2: 178. "A foot or two high in rich, wet ground, the flowers greenish-white. Used as a remedy for wounds, by local application." Coripata, March 28, 1894. (*No. 2109.*)

POLYGONUM PERSICARIOIDES H.B.K. Nov. Gen. 2: 179. "Abundant in very wet soil, where water is standing or running, flowers light-red." Coripata, February 24, 1894. (*Nos. 2061* and *2552.*)

POLYGONUM ANOMALUM Small, Bull. Torrey Club 24: 46. *pl. 293.* 1897. (*No. 1970a.*)

SARCOGONUM VULCANICUM (Endl.) Rusby, Mem. Torrey Club 4: 252. (*No. 2036.*)

ARISTOLOCHIACEAE

Aristolochia yungasensis sp. nov.

Finely tomentellate except the glabrous upper leaf-surfaces; root elongated, sparingly branched, fleshy and tuberous-thickened; twining stems stoutish, costate; petioles 2–3 cm. long, slenderly costate; blades 0.6–1 dm. long from the summit of the petiole, 4–8 cm. broad, ovate, strongly cordate, the summit of the sinus as well as the lobes regularly rounded, regularly acuminate and obtusish at the summit, entire, rather thin, strongly 3-ribbed or 5- to 7-ribbed by one or two pairs deflected into the basal lobes, coarsely and slenderly reticulate, the principal veins lightly prominent underneath; pedicels about 3 cm. long in flower, thickened upward, strongly costate; basal sac of perianth 1.5 cm. long, 1 cm. broad; the narrow, lightly curved portion of tube 1.5 cm. long, 0.5 cm. broad, costate, dilated suddenly into a broadly campanulate deep-purple body about 1 cm. long; greenish lip nearly 2 cm. long and broad, rounded, the base glabrous and strongly seven-nerved, the nerves purple, a purple crescent separating the body of the lip which is coarsely purple-papillose and ciliate.

"Abundant in coca-plantations, climbing a few feet and flowering sparsely, the flower brown and black; called 'Vejugo,' the leaves and root used for snake-bite." Coripata, May 18, 1894. (*No. 2199.*) Species related to *A. rumicifolia.*

PIPERACEAE

(For species not here enumerated see Bull. Torrey Club **25**: 566. 1898.)

Piper lanceolatum R. & P. Fl. Per. **1**: 36. "A shrub 6–10 ft. high, in forest-mould; scarce." Coroico, September, 1894. (*No. 2431.*)

Piper Pavonii (Miq.) C. DC. Prodr. **16**[1]: 294. (*No. 2642.*) (*Artanthe Pavonii* Miq. Lond. Jour. Bot. **4**: 450. 1845.)

Piper psilophyllum C. DC. Bull. Torrey Club **19**: 47. 1892. (*No. 2900.*)

Piper subfuscum C. DC. Jour. Bot. **4**: 217. 1866. "A shrub 6–8 ft. high, growing in wet forest-mould; scarce." Coroico, September, 1894. (*No. 2475.*)

Piper trigoniastrifolium C. DC. Bull. Torrey Club **25**: 567. (*No. 2917.*)

Peperomia blanda H.B.K. Nov. Gen. **1**: 67. (*No. 1819.*)

Peperomia multispica C. DC. Bull. Torrey Club **25**: 571. (*No. 2039.*)

PEPEROMIA BOLIVIENSIS C. DC. Prodr. **16**[1]: 453. "Grows on old trunks in forests, the leaves very fleshy, requiring a long time to dry." Coripata, June 10, 1894. (*No. 2324.*)

PEPEROMIA COBANA C. DC.; J. D. Smith, Bot. Gaz. **19**: 260. 1894. (Specimen without number.)

PEPEROMIA GALIOIDES H.B.K. Nov. Gen. **1**: 71. *pl. 17.* (*No. 2643.*)

PEPEROMIA HISPIDULA (Swartz) A. Dietr. Sp. Pl. **1**: 165. (*No. 1796, a.*)

PEPEROMIA LARECAJANA C. DC. Prodr. **16**[1]: 406. (*No. 2898.*)

PEPEROMIA MANDONII C. DC. Prodr. **16**[1]: 395. (*No. 1719.*)

PEPEROMIA MELANOSTIGMA Miq. Syst. 90. "Grows in wet forest-mould." Coroico, September, 1894. (*No. 2451.*)

PEPEROMIA PARVIFOLIA C. DC. Jour. Bot. **4**: 133. 1866. (*No. 1860.*)

PEPEROMIA REFLEXA A. Dietr. Sp. Pl. **1**: 180. (*No. 2644.*)

? PEPEROMIA SAXICOLA C. DC. Bull. Torrey Club **25**: 571. 1898. (*No. 2899.*)

PEPEROMIA UMBILICATA R. & P. Fl. Per. **1**: 30. *pl. 45, f. b.* "Grows on old trees, the flowers white; scarce." Coroico, September, 1894. (*No. 2448.*)

PEPEROMIA TRINERVIS R. & P. Fl. Per. **1**: 32. *pl. 50, f. b.* "Grows in wet forest-mould, the flowers green." Coroico, September, 1894. (*Nos. 2455, 2638* and (?) *2450.*)

CHLORANTHACEAE

TAFALLAEA GLABRATA (H.B.K.) Rusby, Mem. Torrey Club **4**: 252. "A tree 20–30 ft. high, growing in wet forests, the flowers yellowish-white. Differs from *388* only in having but two flowers together. Scarce." Coripata, May 7, 1894. (*No. 2178.*)

MONIMIACEAE

MOLLINEDIA RUSBYANA Perkins, Bot. Jahrb. **27**: 682. "A slender shrub, 5–6 ft. high, growing in shade, in forest-mould, the flowers green; scarce." Coripata, September 13, 1894. (*No. 2430.*)

MOLLINEDIA CALONEURA Perkins, Bot. Jahrb. **27**: 663. (*No. 1976.*)

MOLLINEDIA sp. apparently undescribed, related to *M. Schottiana* (Spreng.) Perkins. "A shrub about 6 ft. high, growing in wet

forest-mould, the flowers green." Coroico, September, 1894. (*No. 2460.*)

SIPARUNA CHRYSANTHA Perkins, Bot. Jahrb. **31**: 746. "Shrubby and half-climbing to 10 or 12 ft., growing in shade, in forest-mould; strongly odorous." Coroico, July 25, 1894. (*No. 2363.*)

PROTEACEAE

Panopsis Pearcei sp. nov.

Inflorescence minutely puberulent; petioles 1–1.5 cm. long, very stout; blades 0.6–1.2 dm. long, 3.5–5 cm. broad, oval, entire, obscurely cuspidate, very thick, the secondaries 8–10 pairs, connecting close to the margin, the venation very prominent on both sides, reticulate, most of the meshes containing a free branch which terminates in a pair of recurved branches; panicles terminal, sessile or short-peduncled, the branches sharply striate, blackish with whitish warts; pedicels 3–4 mm. long, elongating in fruit, terete, thickened upward; perianth 4 mm. long, the divisions linear; ovary 1 mm. long, pilose; style 2.25 mm. long, stout, cylindrical or slightly clavate; stamens inserted near the base, equaling the style, the anthers nearly 1 mm. long, penicillate. (*No. 2237.*)

The same collected by *Pearce* at Moro, 4,500 ft., January, 1866.

LAURACEAE

?ANIBA AMAZONICA (Meissn.) Mez, Jahrb. Berlin **5**: 69. 1889. (*Aydendron amazonicum* Meissn.; DC. Prodr. **15**[1]: 89.) (*No. 2556.*)

PERSEA sp. (*No. 2902.*)

?OCOTEA ALBIDA Mez & Rusby, Mem. Torrey Club **16**: 114. (*No. 2214.*)

?OCOTEA RETICULATA Mez, Jahrb. Berlin **5**: 308. 1889. "A tree 20 ft. high or more, growing in wet forest-mould, the flowers white; scarce." Coripata, much higher than the town, May, 1894. (*No. 2187.*)

Ocotea prunifolia sp. nov.

Finely and lightly canescent, the leaf-surfaces very sparingly so; branchlets numerous, short, flexuous, coarsely angled, blackish, leafy; petioles 1–1.5 cm. long, flat, stoutish; blades 0.75–1.5 dm. long, 2.5–4.5 cm. broad, lance-ovate, somewhat inequilateral, the base blunt but abruptly a little produced, obtusish at the apex, entire, thick and coriaceous, shining above, the venation slightly prominent above, more so underneath, the strongly ascending secondaries about 10 pairs, the venation finely and strongly reticulate;

panicles axillary and terminal, loose, 1–1.5 dm. long, including the strong peduncles, two thirds as broad, the rachis and branches flexuous, the flowers densely clustered upon the branchlets, the lanceolate, obtuse, coriaceous bracts 5 mm. or less long. Only staminate flowers seen, the plant apparently dioecious. Perianth puberulent, especially the tube, which is 1 mm. long, turbinate; lobes 2 mm. long, nearly as broad, oval, rounded at the apex, coriaceous; filaments puberulent, nearly 1 mm. long, uniform or those of the third series slightly narrower; anthers nearly 1 mm. long, the outermost triangular-ovoid, rounded at the summit, twice as broad or more than the filament, the innermost lance-oblong, scarcely broader than the filament; glands half the length of the filament, broader than long, thick and fleshy, sessile, each broadly grooved upon its inner face; fourth stamen-series not present; rudimentary pistil 2 mm. long, the very small ovary white-pilose, the style thick, the blackish stigma 3-lobed, twice or thrice as broad as the style.

"A stout tree, 20 to 30 ft. high, with yellow flowers, growing in wet mould; scarce." Coripata, April 24, 1894. (*No. 2144.*)

NECTRANDA LAEVIS Mez, *l. c.* 451. (Specimen without number, probably distributed as part of *1646.*)

NECTANDRA BERCHEMIFOLIA Meissn.; DC. Prodr. **15**[1]: 154. (*Nos. 2558* and *2901.*)

NECTANDRA CITRIFOLIA Mez & Rusby, Mem. Torrey Club **6**: 115, var.? "A tree 40–50 ft. high, in forest." Coripata, April 18, 1894. (*No. 2133.*)

NECTANDRA LAUREL Klotzsch; Nees, Linnaea **21**: 505. 1848. (*No. 2187.*) The same as *Matthews*, collected in Peru.

?NECTANDRA WARMINGII Meissn.; Warm. Vid. Medd. **1870**: 141. (*No. 2214.*) The presence of this species so far from the type locality is surprising, but it appears to agree with Warming's *no. 718.*

LORANTHACEAE

Struthanthus oblongifolius sp. nov.

Glabrous except the minutely puberulent flowers; branches straight, rigid, terete, dark-brown; leaves tapering into a short petiole-like base, 0.7–1.5 dm. long, 2–8 cm. broad, oblong or oval, varying to ovate or obovate, abruptly narrowed at the base, rounded at the summit, the venation, including the midrib, obscure on both sides; calyx 5 mm. long, the lower portion depressed-globose, a little longer than the cupulate upper portion which is 3 mm. broad, as pressed, the erect margin shortly toothed; corolla 1 dm. long, the lower half 2 mm., the upper 3.5 mm. broad, the oblong lobes erect; anthers about 7 mm. long, linear-oblong, the upper set

reaching nearly to the tip of the corolla, the lower reaching to the base of the upper; stigma capitate, oblong, 1 mm. long, slightly exceeding the anthers. (*No. 2555.*)

PHORADENDRON CORIACEUM Eichl. in Mart. Fl. Bras. 5^2: 121. (*No. 2903.*)

PHORADENDRON MESEMBRYANTHEMIFOLIUM Griseb.; Rusby, Bull. Torrey Club **27**: 136. 1900. (*Nos. 1926* and *2035.*)

PHORADENDRON SUBTRINERVE Rusby, Mem. Torrey Club **6**: 117. (*No. 2553.*)

PHORADENDRON PEARCEI Rusby, Bull. Torrey Club **27**: 136. 1900. (Specimen without number.)

Phoradendron tafallaeoides sp. nov.

Glabrous except the sparsely pilose bases of the peduncles; branches stout, the internodes about 2.5 cm. long; petioles nearly 1 cm. long, broad, thinly margined, articulated to a shallow base which projects sharply on the lower side; blades 5–7 cm. long, 3–4 cm. broad, oval or slightly broader below, abruptly very short-pointed at both ends, thick, the venation prominent both sides, especially above, the secondaries very slender, crooked, irregular and irregularly branched; peduncles 1–1.5 cm. long, stout, coarsely angled, the spikes 2–4 cm. long, very loosely flowered; pedicels 2 mm. long and about as broad; calyx 3.5 mm. broad, crateriform, shallowly lobed; berry oval, rounded at the apex, 7 mm. long, 5 mm. broad; flower not seen. (*No. 2554.*)

ANTIDAPHNE VISCOIDEA Poepp, et Endl. Nov. Gen. et Sp. **2**: 70. *pl. 199.* (*No. 2257.*) Distributed as "*Styloceras* sp. nov.?"

SANTALACEAE

QUINCHAMALIUM MAJUS Brongn. Voy. Coq. *pl. 51, f. a.* (*No. 1944.*)

EUPHORBIACEAE

EUPHORBIA GENICULATA Orteg. Hort. Matr. Dec. 18. (*No. 2208.*)

EUPHORBIA HYPERICIFOLIA L. Sp. Pl. 454. (*No. 2905.*) Not the same form as *no. 2*, etc.

EUPHORBIA ORBICULATA H.B.K. Nov. Gen. **2**: 52. (*No. 2273.*) The same as *Triana's* Bogota specimen, *no. 354* (or *3541?*).

Euphorbia (*Tithymalus*) **boerhaavioides** sp. nov.

Glabrous; root tuberous; stems 0.75–1.5 dm. long, widely branched, the branches slender, flexuous, purplish, the internodes 1–2 cm. long; stipular glands inconspicuous; lower leaves alter-

nate, small, the upper opposite, 1–2 cm. long, 6–9 mm. broad, ovate-oblong, sessile, blunt, entire, bright-green, thick, obscurely 3-nerved with numerous fine, erect veins; peduncles 4–5 mm. long, solitary in the axils, erect, stoutish for the size of the involucre, which (the pistillate) is 2 mm. long and broad, campanulate, thick, deep-purple, the 5 glands broad, thick, strongly recurved, unappendaged; ovary 1.5 mm. long, ovoid, obtuse, obtusely 3-angled, the styles 1.5–2 mm. long, strongly recurved, 2-cleft about halfway, thickish, purple; perianth-segments white, linear, one at each angle of the ovary and about half its length; involucre of the staminate flowers similar, its segments white, mostly purple-tipped, as long as the glands, lacerate at the broad summit, narrowed downward; rudimentary pistil present; interstaminate bracts thickish, flat, purple-tipped, longer than the stamens. (*No. 2504.*)

Species obviously related to *E. Ipecacuanha*, but peculiar in its solitary axillary involucres.

Euphorbia boliviana sp. nov.

Sparsely pilose with long hairs and grayish-puberulent with intermediate short ones; stems prostrate, about 1 dm. long in my specimen, profusely branched, stoutish for the size of the plant, deep-purple-red, terete; stipular-glands broadly ovoid, short-pointed, purple; leaves opposite, nearly sessile, 4–8 cm. long, 2.5–5 mm. broad, ovate, inequilateral, especially at the truncate or lightly cordate base, blunt, irregularly and rather obscurely serrate-dentate, thickish, mostly purple; pedicels about 1 mm. long, thick; involucre 1 mm. long, narrowly campanulate, the segments narrow, pointed, the white or purplish glands shortly 2-horned. (*No. 2907.*)

The same as *Mandon 1064* and *Mathews 502*. Species apparently related to *E. thymifolia*.

Euphorbia longipila sp. nov.

Long and softly purplish-white pilose throughout; stem herbaceous from a stout perennial root, ascending, much-branched, the branches erect, elongated, slender, terete; stipular glands not apparent; leaves all alternate; petioles 0.5–1 cm. long, slender, divergent or deflexed; blades exceedingly variable in size, from 0.72– cm. long, 0.4–1.5 cm. broad, oval or mostly sub-rotund, varying to ovate, rounded, truncate or slightly produced at the base, rounded at the summit, very thin, pale, the midrib and 4 pairs of secondaries not prominent, broad and coarse; involucres cymose-fascicled at the ends of the branchlets; pedicels very short; involucre green with a white border, or some purple, campanulate, 1 mm. long and broad, the segments very small, greenish, the glands much larger, yellow, bearing 3 linear teeth as long as themselves; pistil less than 1 mm. long, the globose ovary about as long as the yellow styles, which are parted to the base. (Specimen without number.)

Phyllanthus brasiliensis (Aubl.). (*Conami brasiliensis* Aubl. Pl. Gui. 2: 927. *pl. 324.*—*Phyllanthus Conami* Swartz, Prodr. Veg. Ind. Occ. 288.) "A shrub, 10–12 ft. high, growing in gravelly, rather wet soil near the river, the flowers green; scarce." Coripata, March 14, 1894. (*No. 2086.*)

PHYLLANTHUS LATHYROIDES H.B.K. Nov. Gen. 2: 110. (*No. 1778.*)

CROTON ANDINUS Muell.-Arg. Linnaea 34: 126. 1865. (*Nos. 1927* and *1929.*) The same as *Mandon 1075.*

CROTON GLANDULOSUS L. Syst. ed. 10. 1275. "Grows 1 to 2 ft. high in ordinary soil, the flowers greenish-white." Coripata, March 28, 1894. (*No. 2106.*)

CROTON LOBATUS L. Sp. Pl. 1005. "In dry clay, on hillsides; scarce." Coripata, April 18, 1894. (*No. 2130.*)

CROTON SELLOWII Baill. Adansonia 4: 304. 1864. (*No. 2657.*)

ACALYPHA LECHLERI Britton; Rusby, Bull. Torrey Club 28: 304. 1901. (*No. 2610.*) The same as *Rusby 1420.*

ACALYPHA HIBISCIFOLIA Britton; Rusby, Mem. Torrey Club 4: 257. (*No. 2906.*)

Acalypha eugenifolia sp. nov.

Rather densely pilose with soft, white, mostly reflexed hairs; a shrub, the branchlets rather numerous, short, very leafy; stipules purple, 2–3 mm. long, narrowly subulate or aristiform from a broad base, strongly 1-ribbed; petioles 0.5–4 cm. long, stoutish; blades 0.5–1.25 dm. long, 1.5–3 cm. broad, lanceolate, obtusish at the base, long-acuminate or attenuate at the apex, finely serrate, thin, rather pale, nearly smooth above, long-pilose underneath, where the slender venation is slightly prominent, the secondaries about 10 pairs, very strongly ascending; staminate spikes numerous, 3–6 cm. long, 2–3 mm. broad; pistillate spikes terminal, solitary, 0.5–1.5 dm. long, in flower 1 cm., in fruit 2 cm. broad; scales of the pistillate spikes mostly 5-cleft, the divisions lanceolate-attenuate, 4–5 times the length of the body, very strongly ribbed, pilose and ciliate; ovary globoidal, 3-lobed, green, densely white-pilose, 1 mm. long; styles 4–5 mm. long, bright-purple, long-pilose toward the base, the divisions filiform, tapering. (*No. 2368.*)

"A shrub about 8 ft. high, with red flowers, abundant in dry sand and gravel." Near Coroico, August 3, 1894.

Acalypha foliosa sp. nov.

Finely strigose; stems stout, coarsely angled; stipules 1.25 cm. long, 3 mm. broad at the base, from which they taper regularly to

an obtusish point; petioles 0.5–1.5 dm. long, slender but rigid, costate; blades 1–1.5 dm. long, 0.8–1 dm. broad, ovate, rounded or truncate to subcordate at the base, acute at the apex, finely serrate-dentate, the teeth acutish; texture thin, venation pale, prominent both sides, the secondaries slender, 10–15 pairs, connecting at the margin and connected by the tertiaries; spikes (immature) 3–4 mm. thick, 5 cm. long, cylindrical, loosely or densely flowered; flowers not yet expanded.

"A shrub 15–20 ft. high, with hollow stem and branches, the flowers greenish-yellow. Scarce in rich rocky ground near the river." Coroico, August 20, 1894. (*No. 2391.*)

Acalypha lucida sp. nov.

Younger leaves minutely scurfy underneath, otherwise glabrous; branches erect and rigid, purple, coarsely sulcate and angled; stipules caducous, 0.5–1 cm. long, linear, attenuate; petioles 2–4 cm. long, slender, lightly channeled on the upper side, purple like the midrib; blades 1–1.5 dm. long, 3–5 cm. broad, angularly oblong, ovate, many inequilateral, the base blunt, rather abruptly narrowed and then tapering to an acute point, serrate with obtusish teeth, membranaceous, pale and shining underneath, the slender venation rather prominent both sides, the secondaries about 10 pairs, strongly ascending, apparently but not really connecting at the margin, the tertiaries meeting at their ends and by lateral branches about midway between the secondaries, very numerous, only 2–3 mm. apart; peduncles purple, stout, 2–3 mm. long, the (immature) spikes 0.4–1 dm. or more long, 3 mm. broad; flowers not yet expanded. (*Nos. 2560* and *2561.*)

ALCHORNEA TRIPLINERVIA (Spr.) Muell.-Arg. in DC. Prodr. 15^2: 909. (*Antidesma triplinervium* Spr. Neue Entd. 2: 116.) "A tree 15–20 ft. high, growing in dry clay." Coripata, March 3, 1894. (*Nos. 2077* and *2279.*)

CONCEVEIBA GUIANENSIS Aubl. Pl. Gui. 2: 924. *pl. 353.* (*No. 2557.*)

? CONCEVEIBA PUBESCENS Britton; Rusby, Bull. Torrey Club 28: 306. 1901. (*No. 2375.*)

TRAGIA SELLOWIANA GLABRIFOLIA Britton; Rusby, Bull. Torrey Club 28: 307. 1901. "In dry clay and gravel at Coripata." May 10, 1894. (*No. 2182.*)

TRAGIA VOLUBILIS L. Sp. Pl. 980. (*No. 2904.*) The same collected by *Holton* at La Paila.

Tragia aurea sp. nov.

Densely ferruginous with spreading hairs; stems slender, terete, lightly striate; petioles about 5 mm. long, stout; blades 2.5–5 cm.

long, 0.7–2 cm. broad, ovate, lightly cordate, acuminate and acute, sharply and coarsely serrate, thickish but flaccid, green above, yellow underneath, the midrib and 8–10 pairs of secondaries scarcely prominent on either side; racemes very young and undeveloped; bracts 1 mm. long, lance-linear, acute; calyx campanulate, 1.5 mm. long, parted nearly to the base, the lobes lanceolate, obtusish; ovary 1 mm. broad, 0.5 mm. long, very deeply 3-lobed, the styles 1 mm. long, stout, erect-spreading, yellowish, puberulent, the stigmas terminal, small; staminate flowers not seen.

"A climber, 6 ft. high, in dry clay and gravel. Flowers green." Coroico, September, 1894. (*No. 2454.*)

Species at first thought identical with *Holton's* plant from New Grenada, but that has elongated racemes, much larger bracts and long-pedicelled flowers.

Tragia Bangii sp. nov.

Hispid-pilose throughout; root vertical, stout, strongly few-branched; stems erect or ascending, slender, sparingly branched, 2–3 dm. long; stipules 3–5 mm. long, ovate, obtuse, purple; petioles 1–1.5 cm. long, stout, strongly ascending; blades 1.5–4 cm. long, 0.75–2.5 cm. broad. ovate, cordate, acute, serrate-dentate, the teeth somewhat rounded but shortly and acutely pointed, thickish, pale-green, the venation rather coarse, lightly prominent, the secondaries 6–8 pairs; spikes solitary in the axils and lightly panicled at the summit, 2–3 cm. long, slender, incurved, rather densely flowered, the bracts similar to the stipules; calyx of the pistillate flower deeply parted, the lobes linear-oblong, 4 mm. long; capsule nearly 1 cm. broad, 5 mm. long, densely white-pilose; seed 4 mm. long, light yellowish-brown, veined.

"Small plant, a few inches high, the flowers yellowish-white; scarce on clayey hillsides." Coripata, Yungas, April 10, 1894. (*No. 2125.*)

DALECHAMPIA TRIPHYLLA Lam. Encyc. **2**: 258. "A climber growing in wet mould by the roadside, the flowers green." Coripata, May 10, 1894. (*No. 2181.*)

DALECHAMPIA CANESCENS H.B.K. Nov. Gen. **2**: 98. The same as *Holton 845* and *846*. "A climber, growing in dry, gravelly soil, the flowers greenish-white; scarce." Coripata, March 15, 1894. (*No. 2091.*)

URTICACEAE

CELTIS MORIFOLIA Planch. Ann. Sci. Nat. III. **10**: 311. 1848. (*No. 1902.*)

TREMA MICRANTHA (L.) Blume, Mus. Bot. Lugd.-Bat. **2**: 58.

(*Rhamnus micranthus* L. Syst. ed. 10. 937.) "A shrub 15 to 20 ft. high, in dry gravelly soil, the flowers green, the fruit black; scarce." Coripata, February 24, 1894. (*Nos. 2065* and *2611.*)

MORUS ALBA L. Sp. Pl. 986. (Specimen without number.) The same as *Heller 448* from Texas.

Ficus oblanceolata sp. nov.

Glabrous; branchlets stout but weak, rough with leaf-scars which are about 2 mm. broad; petioles 0.5–1.5 cm. long, dark-brown, very stout; blades 0.5–1 dm. long, 2.5–4 cm. broad, oblanceolate to obovate, obtuse at the base, abruptly very short-pointed and blunt at the summit, very pale, thick and coriaceous, the midrib plane above, very prominent underneath, the principal secondaries about 15 pairs, alternating with lesser ones, slender, nearly straight, at nearly right-angles with the midrib, connecting about 2 mm. from the margin; fruit sessile or very short-peduncled, globose, about 5 mm. broad, yellowish or brownish-green with darker spots.

"A tree 30 ft. or more high, scarce in sandy and gravelly soil, near the river." Coroico, August 2, 1894. (*No. 2369.*) *Pearce* collected what is probably the same species.

Cecropia elongata sp. nov.

Peduncles lightly, upper leaf-surfaces coarsely, scabrous; petioles (length unknown) sharply many-costate; leaves divided two thirds or three fourths of the way, the lobes oblanceolate, rounded or obscurely short-pointed at the summit, the middle lobe 3 dm. in length of midrib, 7.5 cm. broad, the outermost 1.5 dm. long, 5 cm. broad, the finely many-nerved midrib and about 40 pairs (on terminal leaflets) of secondaries brown, very prominent underneath, connected by the slender nearly straight tertiaries; peduncles stout, pilose with few stiff white hairs; spikes cylindrical, 1.5–2.5 dm. long, about 7 mm. thick, occasionally branched, drying blackish. (*No. 2260.*)

URTICA MAGELLANICA Juss.; Poir. Encyc. Suppl. 4: 223. 1833. (*No. 1833.*)

PILEA HYALINA Fenzl, Denks. Akad. Wien 1: 250. 1850. Coripata, April 11, 1894. (*No. 2126.*)

PILEA ANOMALA Wedd. Ann. Sci. Nat. III. 18: 217. 1852. "Grows in wet mould, the flowers white." Unduavi, September, 1894. (*No. 2490.*) The same as *Rusby 1478* and *1480.*

PILEA ROTUNDATA Griseb. Fl. Brit. W. Ind. 158. (*No. 1796.*) The same as *Rusby 1483.* Many collections of this, in both eastern and western tropical America, have been referred to *P. dauciodora* Wedd.

Pilea filipes Rusby, Bull. Torrey Club 28: 311. (*No. 1788.*)

Pilea urerifolia Rusby, Bull. Torrey Club 28: 312. (*No. 2374.*) The same as *Rusby 1481.*

Boehmeria brevirostris Wedd. Ann. Sci. Nat. IV. 1: 201. 1854. (*No. 1800.*) The same as *Rusby 1280* and *1281.*

Myriocarpa densiflora Benth. Bot. Voy. Sulph. 169, in obs. (*No. 2219.*)

Phenax pallida Rusby, Mem. Torrey Club 4: 259. (*No. 2562.*)

MYRICACEAE

Myrica arguta H.B.K. Nov. Gen. 2: 17. *pl. 98.* "A shrub 15–20 ft. high growing in rather dry gravel and clay; scarce." Coripata, April 4, 1894. (*Nos. 1808, 2049* and *2121.*)

CASUARINEAE

Lacistema aggregatum (Berg.). (*Piper aggregatum* Berg. Act. Helv. 7: 131. *pl. 10.* 1777. *Fide* Swartz. — *Lacistema myricoides* Swartz, Prodr. Veg. Ind. Occ. 12.) "A shrub about 8 ft. high, in hedges, in gravelly soil along roadsides; abundant." Coroico, August 30, 1894. (*Nos. 2400* and *2551.*)

CUPULIFERAE

Alnus acuminata H.B.K. Nov. Gen. 2: 20. (*No. 1893.*)

BURMANNIACEAE

Apteria boliviana sp. nov.

Glabrous; roots tangled, rather coarse; stems rhizomatous at the base, the erect portion 3–4 cm. long, subfiliform, dark-blue, sparsely branched, the branches erect; leaf-vestiges 2 mm. long, ovate, acute, sheathing by a broad base, brownish, scarious; flowers terminal, solitary, erect or more or less recurved; perianth deep-blue, darker at the base, 0.75–1 cm. long, infundibular-campanulate; lobes 6, about 1 mm. long, three of them broader; stamens inserted about the middle of the tube, 1.5 mm. long, the filaments very short, thick and fleshy, the wing at the base of the anthers about 1.5 mm. broad, 1 mm. long, the thecae a little more than half the length of the wing; ovary 2 mm. long, 1.5 mm. broad, oval; style thick and fleshy, 3 mm. long, the branches 1 mm. long, broadly dilated upward, the summit rounded or subtruncate, the delicate appendages (of texture similar to the wings of the stamens) about as long as the style-branches. (Specimen without number.)

Species near *A. lilacina* Miers.

ORCHIDACEAE

ISOCHILUS LINEARIS (Jacq.) R. Br. in Ait. Hort. Kew. ed. 2. 5: 209. (*No. 2913.*)

TELIPOGON sp. (*No data.*)

CRANICHIS CILIATA Kunth, Pl. Aeq. 1: 324. (*No data.*)

EULOPHIA MACULATA Reichb. f. Walp. Ann. 6: 647. (*No data.*)

STANHOPEA EBURNEA Lindl. Bot. Reg. *pl. 1529.* (*No data.*)

HOULLETIA ODORATISSIMA Linden; Lindl. & Paxt. Flow. Gard. 3: 172. (*No data.*)

PELEXIA sp. (*No data.*)

PRESCOTTIA sp. (*No. 2439.*)

PRESCOTTIA sp. (*No data.*)

TRICHOPILIA FRAGRANS Reichb. f. Otto Hamb. Gard. 14: 229. (*No data.*)

Aganisia boliviensis Rolfe, sp. nov.

Densely tufted. Leaves petiolate, lanceolate, acuminate, trinerved, 4–7 in. long, .5–1 in. broad; petioles 1–3 in. long. Scapes erect, 1.25–1.5 ft. high; racemes 2.5–3.5 in. long, about 8–12-flowered. Bracts spreading, lanceolate, acute, 2–3.5 lin. long. Pedicels 6–7 lin. long. Sepals ovate-oblong, obtuse, 5–6 lin. long, the lateral rather broader than the dorsal. Petals rather shorter than the dorsal sepals, but otherwise similar. Lip shortly stalked, pandurately trilobed, 4.5 lin. long; side lobes suborbicular, 1.5 lin. long; front lobe short and obtuse, prolonged laterally into a pair of rounded lobes, scarcely smaller than the side lobes; disc bearing an erect, bilobed callus about the center. Column broad, 1.5 lin. long, with broad, membranous, entire wings. (*No. 2909.*)

Allied to the Peruvian *A. ionoptera* Linden & Reichb. f., but distinctly different in the shape of the lip.

Pterichis Bangii Rolfe, sp. nov.

Leaves linear-oblong, subobtuse, narrowed about the middle into a long petiole, nearly as long as the blade, which latter measures about 2.5 in. long by 5–6 lines broad. Scapes erect, 6–12 in. long, bearing two to four long narrow sheaths, pubescent or almost velvety. Racemes 2–3 in. long and rather lax, velvety. Bracts ovate or ovate-lanceolate, acute, velvety, 3–5 lin. long. Dorsal sepal ovate-lanceolate, acute, united with the petals into an erect hood, about 3 lin. long; lateral sepals lanceolate, acuminate, 3 lin. long. Petals oblong-lanceolate, acute. Lip broadly reniform-orbicular, concave, obscurely trilobed, 4 lin. broad, somewhat velvety, and bearing several prominent radiating veins; side lobes broadly rounded; front lobe small, triangular, apiculate, and somewhat fleshy. Column broad, 1 lin. long. (*No. 2912.*)

Allied to **Pterichis Mandonii** (*Acraea Mandonii* Reichb. f.), but markedly different in the details of the lip.

Stenoptera longifolia Rolfe, sp. nov.

Leaves oblong-lanceolate, subacute, with a long attenuate narrow base, 1 foot or more long, 10–13 lin. broad, scape tall (base not seen); raceme elongate, rather dense, 6 in. long, pubescent. Bracts ovate-lanceolate, acuminate, pubescent, 5–7 lin. long. Pedicels pubescent, 4–6 lin. long. Sepals very shortly connate at the base, elliptical-oblong, apiculate, pubescent, 3 lin. long. Petals linear, much narrower than the sepals, but nearly as long. Lip cucullate, broadly elliptical, apiculate, obscurely keeled behind, 2.5 lin. long. Column clavate, 1.5 lin. long. (*No. 1920.*)

Remarkable for its much elongated leaves, by which it is readily separated from *S. acuta* Lindl., the other Bolivian species.

RESTREPIA sp. (*No data.*)

? RESTREPIA sp. (*No data.*)

? SOPHRONITIS sp. (*No data.*)

ORNITHIDIUM spp. (2 species, without data.)

Pleurothallis trialata Rolfe, sp. nov.

Stems stout, 4 in. long, bearing a tubular oblong sheath, with a free acute apex, below the middle. Leaf sessile, oblong or lanceolate-oblong, apiculate, 4–4.5 in. long, 1–1.25 in. broad. Scape 7–8 in. long; raceme lax, about 12-flowered. Bracts conduplicate, ovate, shortly acuminate, 4–6 lin. long. Flowers not or scarcely exceeding the bracts. Sepals narrow, with a broader base, and a very strong dorsal wing, 5 lin. long. Petals oblong, apiculate, 2 lin. long. Lip deltoid-oblong, apiculate, canaliculate at the base, clavate, strongly winged, 2 lin. long. (*No. 1816 a*, p.p.)

A remarkable species, allied to *P. crocodilanthe* Reichb. f., but the leaves narrower and less coriaceous, the spike more lax, the bracts larger, and the sepals strongly winged, besides the differently shaped petals and lip. The flowers may not be fully developed, as the forwardest was only beginning to expand when the specimen was dried.

PLEUROTHALLIS CORDATA Lindl. Gen. & Sp. Orch. 5. Coripata, April 20, 1897. (*No. 2151.*)

PLEUROTHALLIS sp. (*No. 2564.*)

PLEUROTHALLIS sp. (*No. 2240.*)

PLEUROTHALLIS spp. (8 species, without data.)

Pleurothallis Brittoni Rolfe, sp. nov.

Stems obscurely angled, moderately slender, 2–3 in. long. Leaves oblong or elliptical-oblong, subobtuse, somewhat attenuate at base,

1.75–2.5 in. long, 6–8 lin. broad. Scapes 3–5 in. long, about 8–10-flowered. Bracts 2 lin. long, tubular, with a short acuminate apex. Pedicels 3 lin. long. Sepals linear-lanceolate, somewhat attenuate towards apex, and subobtuse, 5–6 lin. long. Petals subspathulate-oblong, obtuse, 2.5 lin. long, 1-nerved. Lip elliptical-oblong, subobtuse, 2.0 lin. long, 3-nerved from base to near apex, where the nerves anastomose. Column clavate, 1.5 lin. long. (*No. 1818.*)

A species belonging to the section *Acuminatae* allied to the Venezuelan *P. aurea* Lindl., but smaller in all its parts, and the lip with a distinct median nerve in addition to the lateral pair.

Stelis sp. nov. (?) (No data.)

Stelis sp. (*No. 1797a.*)

Stelis sp. (*No. 1797b.*)

Stelis macrantha Rolfe, sp. nov.

Stems stout, 6–8 in. long. Leaves oblong or elliptical-oblong, oblong or minutely bidentate, petiolate, about 6 in. long, 1–1.5 in. broad; petioles 1–1.5 in. long. Flowering sheaths oblong, apiculate, .75 lin. long, usually producing two racemes. Racemes 7–12 in. long, many-flowered. Bracts broadly ovate-triangular, acute, 3–5 lin. long. Pedicels 2 lin. long. Sepals very unequal; dorsal ovate-oblong, obtuse, 4 lin. long; lateral ones united to near the apex into a broadly ovate, concave body, shorter and much broader than the dorsal sepal, shortly bifid at the apex. Petals short, 1 lin. broad, rounded at the apex. Lip smaller than the petals, truncate, apiculate at each angle. Column broad, slightly longer than the petals. (*No. 1816a*, p.p.)

Mixed with *Pleurothallis trialata* in both the Columbia College and Kew collections.

This species belongs to the section *Dialissa*, and is allied to the Peruvian *S. acutissima* Lindl., though the flowers are considerably larger.

Stelis boliviensis Rolfe, sp. nov.

Stems slender, 2.5–4 in. long. Leaves oblong-lanceolate, subacute, distinctly petiolate, 2.5–3 in. long, 7–10 lin. broad; petioles .5–.75 in. long. Flowering sheaths oblong, apiculate, 4–5 lin. long, producing two racemes, or sometimes only one. Racemes slender, 3–4.5 in. long, many-flowered. Bracts broadly triangular, and apiculate, from a funnel-shaped base, 1 lin. long. Pedicels 1 lin. long. Sepals sub-equal, broadly elliptical, subobtuse, 1.25 lin. long, glabrous. Petals reniformly orbicular, a third as long as the sepals. Lip broadly ovate, subapiculate, concave, channeled along the centre, and with a pair of lateral tubercles near the base. Column very broad, about as long as the lip and petals. (*No. 1817.*)

This species must technically be placed in Lindley's too artificial section *Polystachyae*, in which it seems most allied to the Peruvian *S. mononeura* Lindl. but the lip is not so distinctly trilobed as in that species. The species of this genus are for the most part extremely difficult to distinguish in a dried state, on account of their minute flowers.

Stelis scandens Rolfe, sp. nov.

Rhizome climbing, stoutish, internodes about 1 in. long. Stems stoutish, about 3 in. long. Leaves elliptical-oblong, minutely bidentate, distinctly petiolate, 2–3 in. long, 9–12 lin. broad; petioles 8–10 lin. long. Flowering sheaths ovate-oblong, apiculate, 3–4 lin. long, producing two, three, or sometimes only one raceme. Racemes 2–4 in. long, many-flowered. Bracts ovate-triangular, acute, 1.5–2 lin. long, from a shortly funnel-shaped base, slightly imbricating. Pedicels 1 lin. long. Sepals broadly ovate, subobtuse, 1.5–1.75 lin. long, glabrous. Petals nearly truncate, about a fourth as long as the sepals, .75 lin. broad. Lip broadly triangular-ovate, sub-apiculate, very fleshy, transversely carinate about the middle. Column broad, as long as the petals. (*No. 1817 A.*)

Technically belongs to the section *Polystachyae*, and may be placed next to the Venezuelan *S. grandis* Reichb. f., but is smaller in all its parts, besides having a more scandent habit.

Stelis Brittoniana Rolfe, Mem. Torrey Club **4**: 261. 1895. (*No. 2563.*)

Epidendrum scabrum R. & P. Syst. Veg. 248. (*No. 1940.*)

Epidendrum rigidum Jacq. Enum. Pl. Carib. 29. (*No. 2220.*)

Epidendrum brachycladium Lindl. Fol. Orch. Epid. 60. (*No. 2265.*)

Epidendrum Friderici-Guilielmi Warsc.; Reichb. f. Bonplandia **2**: 110. (*No. 2914.*)

Epidendrum Bangii Rolfe, sp. nov.

Stems stout, a foot or more high (base not seen). Leaves oblong-lanceolate, subobtuse, 3.5–5 in. long, 9–12 lin. broad; sheaths sulcate, and strongly rugose. Racemes 4–6 in. long; several- to many-flowered. Bracts spreading, ovate or lanceolate-ovate, acute or acuminate, 6–10 lin. long. Pedicels 4–5 lin. long. Dorsal sepal oblong-lanceolate, acute, 6–7 lin. long; lateral pair broader and somewhat oblique, acuminate. Petals linear, acute, 5 lin. long. Tip with its base adnate to the column; limb free, entire, fleshy, strongly cordate, partially conduplicate, with the apex acuminate and slightly recurved, 5 lin. long. Column stout, 3 lin. long, with the wings broadly rounded, and connected behind the anther by a thickened margin. (*No. 1963.*)

This species falls under the section *Euepidendrum Planifolia spathacea* in Lindley's artificial arrangement, and may be placed next the New Grenadan *E. macrostachyum* Lindl., which differs among other characters in its longer racemes and smaller flowers, with obtuse sepals and lip.

EPIDENDRUM spp. (10 species, without data.)

ONCIDIUM GLOBULIFERUM H.B.K. Nov. Gen. 1: 347. Coroico, September, 1894. (*No. 2446.*)

ONCIDIUM sp., near *O. abortivum.* (*No data.*)

ONCIDIUM sp., near *O. Crista-galli.* (*No data.*)

ONCIDIUM sp. Leaves only. (*No data*).

Oncidium boliviense Rolfe, sp. nov.

Pseudobulbs ovoid-oblong, subcompressed, 1–1.5 in. long, 7–9 lin. broad, bearing a pair of sheathing leaves at the base, and a single one at the apex. Leaves ligulate, acute, coriaceous, 4–9 in. long, 4–9 lin. broad. Peduncle 1.25–3 ft. long, simple or with several branches 4–7 in. long. Bracts narrowly ovate-lanceolate, acuminate, 2–4 lin. long. Pedicels slender, 3–4 lin. long. Dorsal sepal ovate, acute or apiculate, 3–4 lin. long; lateral pair free, broadly lanceolate, acuminate, rather longer than the dorsal. Petals ovate, apiculate, somewhat undulate, shortly stalked, 3–4 lin. long, rather broader than the dorsal sepal. Lip pandurately trilobed, 7 lin. long; front lobe transversely oblong or nearly reniform, shortly bilobed at the apex, 6 lin. broad; side lobes nearly triangular, with an oblong obtuse apex, 2 lin. long by about as broad; isthmus 1 lin. long by about as broad; crest consisting of about ten linear obtuse papillæ, arranged in two fascicles, and separated by a short median keel. Column 1 lin. long; wings broadly dolabriform, .75 lin. broad.

Coripata, Yungas, May 16, 1894. (*No. 2196.*)

A member of Lindley's group *Hymenoptera expansa*, but markedly different from its allies in the details of the flower.

OCTOMERIA sp. (*No data.*)

Octomeria boliviensis Rolfe, sp. nov.

Stems stoutish, 4–8 in. high, clothed with three to five loose tubular sheaths, acute at the apex. Leaves lanceolate or oblong-lanceolate, obtuse or shortly bidentate, 3.5–4 in. long, 4–9 lin. broad, attenuate at the base into a short petiole. Bracts lanceolate-oblong, acute, striate, 4–5 lin. long. Flowers several in a fascicle. Pedicels 3–4 lin. long. Sepals lanceolate-oblong, acute, 6 lin. long. Petals similar but slightly narrower. Lip elliptical-oblong, 3.5 lin. long, pandurately trilobed; front lobe rhomboid, truncate, crenulate, nearly 2 lin. broad; side lobes small and rounded; disc with two sigmoid keels opposite to the isthmus. Column arcuate, 1 lin. long. (*No. 2185.*)

Allied to the Brazilian *O. grandiflora* Lindl., but the leaves shorter, and the lip much less deeply trilobed, with the side lobes smaller and the front lobe not bifid at the apex.

ZYGOPETALUM INTERMEDIUM PERUVIANUM Rolfe, Lindenia 9 : 71. (*No data.*)

ZYGOPETALUM sp. (*No data.*)

GALEANDRA LAGOENSIS Reichb. f. Otia Bot. Hamb. 88. (*No data.*)

NEODRYAS MANDONII Reichb. f. Xen. Orch. 3 : 21. (*No data.*)

NEODRYAS RHODONEURA Reichb. f. Bot. Zeit. 10 : 835. (*No. 2911.*)

COCHLIODA NOETZLIANA Rolfe, Lindenia 6 : 55. *pl. 266.* (*No. 1801.*)

EPISTEPHIUM AMPLEXICAULE (R. & P.) Poepp. & Endl. Nov. Gen. 1 : 52. *pl. 91.* (*No. 2908.*)

SCAPHYGLOTTIS sp. (*No. 2287.*)

LOCKHARTIA sp. Specimens in fruit. (*No. 2286.*)

GYROSTACHYS sp. Coroico, Yungas, September. (*No. 2439a.*)

GYROSTACHYS spp. (3 species without data.)

PHYSURUS spp. (5 species without data.)

CATASETUM sp. (*No data.*)

ELLEANTHUS sp. (*No data.*)

MASDEVALLIA sp. Coroico, September 8, 1894. (*No. 2494.*)

MASDEVALLIA sp. Coroico, September 8, 1894. (*No. 2424.*)

Masdevallia scandens Rolfe, sp. nov.

Rhizomes climbing, moderately stout, with the internodes .5 to over 1 inch apart. Leaves lanceolate, subacute, somewhat coriaceous, the blade 1.25–3 in. long, 4–7 lin. broad, attenuate at the base into a narrow petiole 1–3 in. long. Scapes moderately stout, 3–4 in. long, 1-flowered. Sepaline tube 2–3 lin. long, by fully as broad ; dorsal limb obovate-oblong, 4 lin. long, and terminating in a stout tail 5–6 lin. long; lateral limbs broadly ovate, 5 lin. long by nearly as broad, and united at their adjacent angle for a short distance beyond their junction with the tube; tails 10–12 lin. long. Petals narrowly oblong, obtuse or minutely bidentate, 2.5 lin. long. Lip elliptical-oblong, obtuse or shortly apiculate, slightly channeled along the center, 2.5 lin. long. Column clavate, narrowly winged, 2 lin. long. (*No. 1797.*)

A very distinct species of the *M. caudata* group, readily distinguished by its scandent habit. Its nearest affinity is at present rather doubtful, but several species are still only known from Reichenbach's descriptions.

Sobralia D'Orbignyana Reichb. f. Xen. Orch. 2: 179 (no description). (*No. 2290.*)

Sobralia dichotoma R. & P. Syst. Veg. 232. (*No. 2266.*)

Maxillaria grandiflora Lindl. Gen. & Sp. Orch. 147. (*No. data.*)

Maxillaria sp. (*No data.*)

?Habenaria Gourlieana Gill.; Lindl. Gen. & Sp. Orch. 309. (*No. 2268.*)

Habenaria sp. (*No. 2910.*)

Habenaria sp. nov. (*No data.*)

Habenaria sp. Coroico, Yungas, September, 1894. (*No. 2440.*)

Habenaria spp. (2 species without data.)

Liparis neuroglossa Reichb. f. Xen. Orch. 3: 26. (*No. 1787.*)

Liparis Rusbyi Rolfe, sp. nov.

Rhizomes creeping, elongated and moderately stout. Leaves two or three, broadly ovate, subobtuse, membranous, 2.5–3 in. long, 2–2.5 in. broad; petioles 1.5–2.25 in. long, broad, and sheathing at the base. Scapes 5–8 in. high; racemes 1.5–4 in. long, lax. Bracts triangular-lanceolate, acute, 3–5 lin. long. Pedicels 6 lin. long. Flowers large. Sepals linear, obtuse, 5 lin. long. Petals narrower than the sepals and rather shorter. Lip obovate, minutely crenulate, slightly retuse at the apex, with numerous radiating nerves, and a pair of minute teeth at the base, 6 lin. long, 5 lin. broad. Column curved, 1.5 lin. long. Capsule ellipsoid, 6–7 lin. long, with a pedicel of about its own length. (*No. 2565.*)

A very distinct species, with the general habit of *L. neuroglossa* Rchb. f., but about twice larger in all its parts. The color of the flowers is not recorded, but in the dried state the lip is distinctly tinged with pink, rather darker on the nerves, while the sepals and petals appear to have been pale whitish green.

Liparis sp. (*No data.*)

Odontoglossum rigidum Lindl. Pl. Hartw. 152. (*No. 1946.*)

Odontoglossum chiriquense Rchb. f. Bot. Zeit. 10: 692. (*No data.*)

Odontoglossum coronarium Lindl. Fol. Orch. Odontog. 21. (*No. 1960.*)

SCITAMINEAE

Costus Mooreanus sp. nov.

Leaves densely and closely sericeous, highly lucid upon the lower surface; stems and petioles not seen; blades 2.5 or 3 dm. long,

about 7 cm. broad, lanceolate, truncate or rounded at the base, acuminate, thick, dull or lightly shining above, the secondaries running nearly parallel with the midrib; spike ovate (but one seen), about 1.5 dm. long, 8 cm. broad, very dense; bracts 4–6 cm. long, the body oblong-lanceolate, obtuse, thick, rigid, yellowish, strongly nerved, bearing foliar appendages, which are 1–2.5 cm. long, 1–2 cm. broad, ovate, acute or obtuse, cordate, sericeous like the leaves, strongly reflexed; corolla (light yellow?), about 7 cm. long, 5 cm. broad, the tube 2 cm. long, slenderly infundibular, the body campanulate.

Vic. Cochabamba. (*No. 2058.*) Species near *C. argenteus* R. & P. Dedicated to Mr. Spencer LeM. Moore, who has kindly pointed out its intermediate position between *C. argenteus* and *C. comosus* Roscoe.

Renealmia ventricosa Griseb. Cat. Pl. Cuba 256. (*No. 2566.*)

Ischnosiphon Parkeri (Rosc.) Koern. Bull. Soc. Nat. Mosc. 35[1]: 81. 1862. (*Phrynium Parkeri* Rosc. Mon. Pl. Scit. *pl. 42.*) (*No. 2567.*)

(*No. 2201* is apparently an undetermined species of *Ischnosiphon*, but dissection material is wanting.)

Maranta Tonckat Aubl. Pl. Guian. 1: 3. "Grows a few feet high, in rich soil, along hedges, the flowers white; scarce." Coripata, April 8, 1894. (*No. 2122.*)

Calathea grandifolia Lindl. Bot. Reg. *pl. 1210.* (Specimen without number.) The same as *Rusby 2226*, although the leaves are smaller.

Calathea nodosa sp. nov.

Glabrous; leaf (but one seen) strongly petioled, the blade 5 dm. long, 2.75 dm. broad, obovate, rounded at both ends; stems strongly nodose-swollen at the insertion of the peduncles; heads about 7 cm. long, 1 dm. broad, very shortly and very stoutly peduncled, about 15–20-flowered; bracts 4–5 cm. long, 2–2.5 cm. broad, oval, the summit very abruptly produced into a slight point, thick and rigid, very finely and very many-nerved; bractlets 4 cm. long, half as broad, oval, obtuse, the summit fimbriate, plicate and bearing two broad, thin, ciliate keels upon the back; flower not seen; fruit nearly 2 cm. long, 7 mm. broad, obovoid, bluntly triangular, inequilateral, shining, tipped by the pale calyx, which is 12 mm. long, the segments oblong, 2 mm. wide, obtuse, stiff, shining, and enclosing the persistent style, which is a little shorter and divided nearly half way; seed black, nearly smooth, 7 mm. long, half as broad, ovoid with truncate base and rounded summit. (*No. 2569.*)

Calathea (*Monostiche*) **stromanthifolia** sp. nov.

Glabrous except for a light scurfiness upon the base of the bracts and under the lens a minute puberulence upon the lower leaf-surfaces; petioles 1–1.5 dm. long, broad; blades 1.5–2.5 dm. long, 0.7–1 dm. broad, obovate, blunt or rounded at the base, very abruptly, very shortly and acutely pointed, pale, thin, the principal secondaries having between them about 25 exceedingly fine nerves running parallel as seen on the upper surface, and as seen on the lower surface connected by innumerable fine transverse ones, the midrib very strong and broad; peduncle (but one seen) light-yellow, about 2 cm. long, rather slender, deflexed; head 5–6 cm. long and nearly as broad, about 12–18-flowered; bracts 3–4.5 cm. long.

Vic. Cochabamba, 1891. (*No. 2009.*)

CANNA PEDUNCULATA Rosc.; Sims, Bot. Mag. *pl. 2323.* "Grows 2–6 ft. high, in wet clay, the flowers yellow." Coripata, September 5, 1894. (*No. 2413.*)

CANNA BRITTONI Rusby, Bull. Torrey Club **29**: 695. 1902. (*No. 2417.*) The same as *Rusby 2857.*

HELICONIA ROSTRATA R. & P. Fl. Per. **3**: 71. *pl. 305.* (*No. 2568.*)

BROMELIACEAE

Aechmea boliviana sp. nov.

Finely scurfy; stems slender, rigid, height unknown; leaves 4–6 dm. long, 1.5–2 cm. broad, linear, narrowed toward the base, which is much-dilated and sheathing, attenuate at the apex, spiny-toothed, the teeth about 2 mm. long, divergent, stoutish, the leaf thick but not rigid; panicle (but one seen) about 7 cm. long and almost as broad, very dense; scales about 4 mm. long, broadly ovate, with a short pungent point, spreading; flowers not seen; capsule 1 cm. long, nearly half as broad, conical-ovoid, soft at the base, cartilaginous at the apex and crowned by three lightly recurved spines 1–2 mm. long; seeds reddish-brown, minutely reticulate, 2–4 mm. long, 1 mm. broad, straight or lightly curved, lance-oblong, obtusish. (Specimen without number or duplicates.)

Aechmea involucrata sp. nov.

Minutely scurfy, the younger portions somewhat floccose; stems very stout, about 4 dm. long in my specimens, concealed in the erect, closely sheathing leaves, which are 1–4 dm. long, 3–5 cm. broad, lanceolate, the outer successively shorter and broader, the outermost broadly ovate, all very strongly nerved, thick and rigid, pungently spine-pointed, the spines dark-purple, the margins pungently spiny-toothed, the teeth 2–3 mm. long, stout, strongly upcurved; spike 2 dm. long, 5 cm. broad, very densely-flowered,

obtuse; bracts, in flowering stage, nearly 1 cm. long, tipped by a stiff, slender point 1 mm. long, many-ribbed, enclosing the base of the flower and the edges nearly meeting, rigid with a rather broad hyaline border; sepals 1.75 cm. long, ovate, short-acuminate, the acute apex slightly recurved-spreading; petals exceeding the sepals by 5–7 mm., purple with darker veins, obovate with rounded summit, concave, semi-rigid; stamens a little shorter than the petals, the filament hyaline-margined, the anther 4 mm. long; ovary 5 mm. long, obovoid, truncate, tuberculate; style stoutish, rigid, 1.5 cm. long, inclusive of the branches, which are 3 mm. long. (Specimen without number or duplicates.)

Pitcairnia biattenuata sp. nov.

Younger portions scurfy-tomentose; stems 7–8 dm. long, slender, from a very stout base, dark-purple, terete; leaves proper all basal, 3–5 dm. long, linear, broadest (about 3 cm.) above the middle, the lower portion very narrow, dark-purple, spiny-toothed, the teeth about 3 mm. long, divergent or slightly recurved, the very base of the leaf abruptly dilated into a very broad sheath; bracts of the stem lanceolate, rigid, closely sheathing, long-acuminate and acute; inflorescence slightly paniculate, the bracts 1 cm. or less long, similar to those of the culm; pedicels about 1 cm. long, spreading; calyx exceeding 2 cm., the tube nearly as broad as long, the segments tapering, rigid, keeled; corolla twice the length of the calyx, strongly recurved.

"A small plant about 5 ft. high, with red flowers, scarce in wet, clayey soil." Coripata, Yungas, April 26, 1894. (*No. 2155.*)

Pitcairnia sessiliflora sp. nov.

Rather sparsely scurfy-tomentose; stems about 1 m. high, slender, terete, striate; leaves proper all basal, numerous, nearly as long as the stem, broadest (about 1.5 cm.) above the middle, the lower portion involute and appearing as though terete, strongly uncinate-toothed, the teeth dark-purple, 1–2 mm. long, some leaves consisting only of these narrow, dark, toothed bases, others terminating in long setiform blades; stem bearing closely sheathing, lanceolate, acuminate and pungently pointed bracts 3–4 cm. long; flowers distantly spicate, the subtending bracts about 1 cm. long, broadly ovate, acuminate, pungent; calyx nearly 2 cm. long, the segments linear-lanceolate, rigid, very strongly keeled, and nerved, acute; corolla 7 cm. long, slender, yellow (?). (Specimen without number or duplicates.)

GUZMANIA MONOSTACHYA (L.) Rusby; Mez, Mon. Brom. 905. (*No. 1802.*) The same as *no. 1582.*

TILLANDSIA FLORIBUNDA H.B.K. Nov. Gen. 1: 292. (Specimen without number.)

TILLANDSIA sp., probably undescribed, but flowers are wanting. (*No. 2202.*)

TILLANDSIA sp. The specimen undeterminable. (*No. 2012.*)

? TILLANDSIA sp. Dissecting material is wanting. (*No. 2301.*)

HAEMODORACEAE

? ZEPHYRA sp. (*No. 2042.*)

IRIDACEAE

SISYRINCHIUM IRIDIFOLIUM H.B.K. Nov. Gen. **1**: 324. (*No. 1864.*)

SISYRINCHIUM JUNCEUM E. Meyer, in Presl, Rel. Haenk. **1**: 118. (*No. 2579.*)

SISYRINCHIUM LEUCANTHUM Colla, Mem. Acc. Torin **39**: 18. 1836. (Specimen without number.) The same as *Rusby 695.*

SISYRINCHIUM MICRANTHUM Cav. Diss. **6**: 345. *pl. 19, f. 2?* (*No. 2578.*) Apparently the same as *John Donnell Smith 3871*, and collected also at Mendoza.

SISYRINCHIUM UNISPATHACEUM Klatt, Linnaea **34**: 737. 1866. (*No. 1922.*)

AMARYLLIDACEAE

HYPOXIS DECUMBENS L. Pl. Jam. Pugill. 11. — Syst. ed. 10. 986. (*No. 1793.*)

HIPPEASTRUM MANDONI Baker, Handb. Amaryll. 49. "A small plant, the flowers red and green." Coroico, September, 1894. (*No. 2476.*) "A small plant with large fleshy bulbs, growing in mould, in forest-shade, the flowers red; abundant." Coripata, June 20, 1894. (*No. 2302.*)

(*No. 2500* is also a species of *Hippeastrum*, perhaps the same.)

BOMAREA ANDIMARCANA Baker, Handb. Amaryll. 147. (*No. 2014.*)

BOMAREA EDULIS (Tussac) Herb. Amaryll. 111. (*Nos. 2037* and *2915*, *fide* Baker. See remarks under this species in Enum. Rusby's plants, Bull. Torrey Club **29**: 224, 225. 1902.)

BOMAREA FORMOSISSIMA (R. & P.) Griseb.; Baker, Handb. Amaryll. 153. (*Alstroemeria formosissima* R. & P. Fl. Per. **3**: 64.) (*No. 1936a.*) The same as *Pearce 705* and *Rusby 566.*

BOMAREA MULTIFLORA (L.) Mirbel, Hist. Nat. Pl. **9**: 72. 1804. (*Alstroemeria multiflora* L. f. Suppl. 207.) (*Nos. 1936* and *2038.*) The same as *Rusby 564.*

BOMAREA SALCILLA Mirbel, *l. c.* 71. (*No. 2039.*)

Bomarea (*Sphaerine*) **flava** Baker, sp. nov.

Leafy part of the stem slender, curved, glabrous, ½ ft. long. Leaves many, crowded, lanceolate, sessile, erect-patent, resupinate, 1–1½ in. long, ¼–⅓ in. broad at the middle, acute, glabrous above, hairy and strongly ribbed beneath. Umbel simple, 4-flowered; pedicels ascending, ½ in. long; bracts small or large. Perianth bright-yellow, ⅓ in. long; segments oblong-spatulate, equal, not spotted on the face, the three outer faintly keeled outside with green. Stamens curved, nearly as long as the perianth; anthers orbicular, small, yellow.

Near *B. minima* Baker, Handb. Amaryll. 144. (*No. 2013.*)

DIOSCOREACEAE

Dioscorea convolvulacea Schlecht. & Ch. Linnaea **6**: 49. 1831. (*No. 2916.*)

Dioscorea cymosula Hemsl. Biol. Cent. Am. Bot. **3**: 355. (*No. 2577.*) The same as *Rusby 1449.*

Dioscorea furcata Griseb.; Mart. Fl. Bras. **3**[1]: 45. "Grows in wet forest-mould and climbs 8–10 ft. high, the flowers greenish-white; abundant." Yungas (Sacramento), August 27, 1894. (*No. 2397.*) The same as *Rusby 532* and *1047.*

Dioscorea Galeottiana Kunth, Enum. Pl. **5**: 409. (*No. 2040.*)

Dioscorea racemosa sp. nov.

Inflorescence, especially the calyx-tube, scurfy-tomentose, gray; stems slender, strongly sulcate; petioles 2–5 cm. long, ribbed; blades 0.7–1.5 dm. long and broad, ovate, cordate with a broad shallow sinus, very abruptly and shortly pointed and acute, very thin, bright-green, 9-ribbed, the ribs prominent only underneath, connected by the sparse, nearly straight secondaries; racemes short-peduncled, 1–2 dm. long, slender, costate, loosely-flowered; pedicels very short and stout; ovary 5–7 mm. long, 2–3 mm. broad, oblong, obtusely triangular, downy, strongly ribbed; perianth-segments 3–4 mm. long, 1.5 mm. broad, lance-oblong, downy at the base, thick; styles nearly equaling the perianth when straightened out, very strongly recurved, thick, bifid about half way, the divisions thick, flattened, acutish.

"A climber, scarce; wet sandy soil near the river, the flowers green." Coripata, May 9, 1894. (*No. 2180.*)

Dioscorea glauca sp. nov.

Pale and glaucous; stems stoutish, terete; petioles (upper leaves only seen) about 5 cm. long, stoutish; blades 1 dm. long, 8 cm. broad, ovate, lightly cordate, very shortly acute-pointed, thickish,

very slenderly 5-nerved, the secondaries sparse and obscure; peduncles 5–7 cm. long, very slender, the racemes (in fruit) 3–3.5 dm. long; ovary 5–8 mm. long, 3 mm. broad, oblong, short-beaked, strongly ribbed; campanulate portion of perianth 2.5 mm. long and broad, the strongly reflexed lobes 1.5 mm. long, ovate, thickish; styles 3, entire, the large stigmas slightly exserted; fruit 3 cm. long, broadly and shallowly cordate at both ends, the wings 2.5 cm. broad, regularly rounded, with numerous fine, obscure nerves transversely disposed.

"Climbing 15 feet or more, the flowers brown; in dry clayey and slaty soil." Coripata, June 20, 1894. (*No. 2334.*)

Dioscorea arcuata sp. nov.

Glabrous, stems stoutish, coarsely angled; petioles 0.75–1.5 dm. long, stout, ribbed; blades 1–2 dm. long, 0.5–1.5 dm. broad, regularly cordate-ovate, the sinus deep and narrow, or the lobes overlapping, abruptly acuminate and acute at the apex, very thin, shining underneath, very strongly about 13-ribbed, the ribs strongly and beautifully curved, prominent underneath, connected by the coarsely reticulate, slender, crooked secondaries; peduncles 3–5 cm. long, slender, spreading, the flower-bearing portion of the raceme 0.5–1 dm. long; pedicels 2–3 mm. long, stoutish; perianth 4 mm. long, the segments oblong-obovate with rounded apex, nearly 2 mm. broad; filaments less than 1 mm. long, thick, the anthers short and broad; fruit 2 cm. long, 8–9 mm. broad, oval, tipped by a very short, stout point. (*No. 1786.*)

LILIACEAE

Smilax mexicana Griseb.; Kunth, Enum. Pl. 5: 167. (*No. 2203*, p.p., with lanceolate leaves.)

Smilax phylloloba Griseb. in Mart. Fl. Bras. 3[1]: 21. (*No. 2203*, p.p., the leaves broadly ovate.) The same as *Rusby 560.*

Smilax tomentosa H.B.K. Nov. Gen. 1: 272. "Grows in good forest mould. Climbing 20 ft. or more high, the flowers yellow; scarce." Coripata, April 19, 1894. (*No. 2134.*) Collected also by *Holton.*

Smilax irrorata Griseb. in Mart. Fl. Bras. 3[1]: 10. (Specimen without number.) The same as *Rusby 561.*

Excremis coarctata (R. & P.) Baker, Jour. Linn. Soc. 15: 320. 1876. (*Anthericum coarctatum* R. & P. Fl. Per. 3: 67. *pl. 299, f. a.*) (*No. 2277.*) The same as *Rusby 2504* and *2856.*

XYRIDACEAE

Xyris sp. — This species is in all probability undescribed, but farther comparison is needed. It appears related to *X. eriophora* Klotzsch. (*No. 2580.*)

PONTEDERIACEAE

EICHHORNIA PAUCIFLORA Seub. in Mart. Fl. Bras. 3[1]: 91. "A small aquatic, the flowers white." Coripata, April 20, 1894. (*No. 2145.*) The same as *Rusby 533.*

COMMELINACEAE

(Determined by Mr. C. B. Clarke)

PHAEOSPHERION PERSICARIAEFOLIUM (Delile) C. B. Clarke, in DC. Monog. Phan. 3: 137. (*Commelina persicariaefolia* Delile in Red. Lil. *pl. 472.*) (*No. 2917.*)

COMMELINA QUITENSIS Benth. Pl. Hartw. 258. (*No. 2010.*) The same as *Rusby 847.*

DICHORISANDRA HEXANDRA (Aubl.) Kuntze, Rev. Gen. Pl. 721. (*No. 2918.*) The same as *Rusby 1230.*

DICHORISANDRA GAUDICHAUDIANA Kunth, Enum. Pl. 4: 113. (*No. 2573.*)

DICHORISANDRA INAEQUALIS Presl, Rel. Haenk. 1: 140. (Specimen without number.) The same as *Rusby 1231.*

DICHORISANDRA VILLOSULA Mart. in Schult. f. Syst. 7: 1185. (*No. 2571.*) The same as *Rusby 1233.*

TINANTIA FUGAX Scheidw. in Otto & Dietr. Allg. Gart. 7: 365. 1839. (*No. 2575.*)

TRADESCANTIA GENICULATA Jacq. Enum. Pl. Carib. 18. (*Nos. 2572* and *2576.*)

JUNCACEAE

JUNCOIDES RACEMOSUM (Desv.) Kuntze, Rev. Gen. Pl. 725. (*No. 1871.*)

JUNCUS ANDICOLA Hook. Ic. Pl. *pl. 714.* (*No. 2410.*)

AROIDEAE

(Determined by Mr. N. E. Brown)

PHILODENDRON RUBENS Schott, Syn. Aroid. 84. (Specimen without number.)

PHILODENDRON sp., the material unfit for determination. (*No. 2586.*)

Stenospermation Rusbyi N. E. Brown, sp. nov.

Stems not seen. Leaves erect, crowded, glabrous; petiole (including the ½–¾ in. long geniculus) 15–16 in. long, broadly sheathing for half its length; blade 11–16 in. long, 4½–4¾ in.

broad, oblong, acute or obtuse with a short subcuspidate point; midrib impressed above; lateral nerves very numerous, crowded, parallel, ascending, slightly curved, not prominent on either side. Peduncle about 2 ft. long, 2 lines thick, recurving at the apex. Spathe about 6 in. long and 1 in. broad, narrowly oblong, acute, tipped with a subulate point ½ in. long, not reflexed in the specimen seen. Spadix 4½–5 in. long, about 4½ lines thick, on the stipes 2–3 lines long. Ovary with a flat, square apex ⅛ in. diameter, imperfectly 2-celled; style about ½ line long; stigma small, discoid; ovules numerous, basal, surrounded with mucilage.

Yungas. (*No. 2609.*)

Allied to *S. multiovulatum* N. E. Br., but differs from that species by the petiole being vaginate for only half its length, the very much narrower spathe, and the short but distinct style.

Anthurium triphyllum Brongn.; Schott, Prod. Aroid. 548. "Grows on old trunks in forest-shade, the flowers green; scarce." Coripata, June 22, 1894. (*No. 2293.*)

Anthurium trinerve Miq. Linnaea **17**: 66. 1843. "On old trunks in forest, the flowers green." Coripata, June 22, 1894. (*No. 2307*, as to specimens with the leaves nearly acute.)

Anthurium violaceum (Sw.) Schott, Melet. **1**: 22. (*Pothos violaceus* Sw. Prod. Veg. Ind. Occ. 32.) (*No. 2307*, as to specimens with leaves tapering at the apex.)

Anthurium Lechlerianum Schott, Prod. Aroid. 534. (*No. 2582.*)

Anthurium gracile Lindl. Bot. Reg. *pl. 1635.* (*No. 2584.*) The same as *Rusby 2429* and *2430.*

Anthurium parile N. E. Brown, sp. nov.*

Stem elongated, ½ in. thick, internodes ¼–½ in. long. Leaves erect, glabrous; petiole 2–3½ in. long, including the 2–3 lines long geniculus; blade 10–12 in. long, 1¼–2¼ in. broad, strap-shaped or oblong-lanceolate, acute or subacuminate at the apex, cuneate at the base; midrib very prominent and rounded above, less prominent beneath; primary lateral nerves numerous on each side of the midrib, sub-parallel, ascending, united in an intramarginal nerve 1¼–3 lines distant from the margin, slightly prominent

* Since the preparation of this paper, this species and the three following ones have been published by Professor Engler, and the places of publication should be cited as follows:

A. parile N. E. Brown; Engler, Pflanzenreich 4^{23b}: 151. 1905.

A. rusticum N. E. Brown; Engler, *loc. cit.* 82.

A. coripatense N. E. Brown; Engler, *loc. cit.* 255.

A. grande N. E. Brown; Engler, *loc. cit.* 204.

on both sides in the dried state. Peduncle 6–11 in. long, 1–1½ line thick. Spathe 1½–2 in. long, 3–4 lines broad, linear-oblong, obtuse, tipped with a subulate point ¼ in. long, amplexicaul at the base, not decurrent, reflexed. Spadix sessile, 2½–3½ in. long, 2–2½ lines thick. Flowers large, 1½–2 lines in diameter. Ovary broadly obovoid; stigma sessile; cells 1-ovulate.

Yungas. (*No. 2585.*)

Allied to *A. gracile* Lindl., but is a stouter plant, and the leaf does not taper so much at the base and apex.

Anthurium rusticum N. E. Brown, sp. nov.

Stem stout. Scale-leaves 4 in. long, 1 in. broad. Leaves erect, glabrous; petiole 4–5 in. long, including the ⅓–½ in. long geniculus, ⅓ in. thick, channeled down the face; blade 2–2¼ ft. long, 6–7 in. broad, broadly oblong-oblanceolate, subobtuse and shortly mucronulate at the apex, cuneately tapering from about the middle to an acute base; margins slightly sinuate; midrib very prominent and acute on both sides in the lower part; primary lateral nerves 14–16 on each side of the midrib, nearly straight in their lower half, then curved and running out to the margin, the 4–5 upper on each side alone uniting in an intramarginal nerve 2–3 lines distant from the margin. Peduncle 12–16 in. long, 2–2½ lines thick. Spathe (only imperfect examples seen) 3–4 in. long, about 1 in. broad, narrowly oblong, reflexed, decurrent for about ¾ in. at the base. Spadix sub-sessile, 3–3½ in. long, ¼ in. thick. Flowers ⅔–1 line in diam. Ovary oblong; stigma sessile; cells 1-ovulate.

Yungas. (*No. 2479.*)

This species somewhat resembles *A. crassinervium* Schott, but has much smaller leaves, and a shorter spadix.

Anthurium coripatense N. E. Brown, sp. nov.

Leaves large, cordate, glabrous; petiole 20–22 in. long, including the 1 in. long geniculus, 3–4 lines thick; blade 18–20 in. long, 1 ft. broad across the basal lobes, elongated deltoid-ovate, apex?, base cordate, with a broad, rounded, open sinus 3–3½ in. deep; basal lobes broadly rounded; midrib prominent on both sides, acute above, rounded beneath; primary lateral nerves 14–15 on each side of the midrib, spreading at an angle of about 45°, nearly straight, the upper ones uniting in an intramarginal nerve 1–1½ line distant from the margin, the lower excurrent at the margin or uniting into an interrupted intramarginal nerve; basal nerves about 8 on each side, the inner one on each side free, all the rest united into one at the base, denuded for about 1¼ in. at the sinus, curved, excurrent at the margin. Peduncle about 20 in. long, 2½ lines thick, glabrous. Spathe (imperfect in the specimens seen) over 6 in. long, about 1 in. broad, strap-shaped, reflexed, amplexicaul or somewhat

decurrent at the base. Spadix 4½–5½ in. long, on a stipe ¼–½ in. long, 3–4 lines thick. Flowers 1 line in diameter. Ovary oblong; stigma sessile; cells 1-ovulate.

Coripata, Yungas. (*No. 2311.*)

Allied to *A. aranthe* Baker, but differs in its more elongated leaf with a much more obtuse basal sinus, and a stouter spadix.

Anthurium grande N. E. Brown, sp. nov.

Leaves large, cordate, glabrous; petiole 2 ft. or more long; blade about 20 in. long, 14 in. broad, exactly ovate in outline, obtuse with a short apiculus at the apex, deeply cordate at the base; basal lobes 5 in. long, broadly rounded, much overlapping; midrib prominent and rounded on both sides; primary lateral nerves about 9 on each side of the midrib, spreading at an angle of about 45°, slightly curved; basal nerves about 7 on each side, the 4 outer of which are more or less united at the base, not denuded at the sinus, and directed downwards into the basal lobes, the others spreading or ascending, all the nerves, lateral and basal, united in an intramarginal nerve 1–1½ line distant from the margin, prominent and rounded beneath, slightly prominent above; under surface densely covered with minute fuscous dots in the dried state. Peduncle 8 in. long in the specimens seen, probably about as long as the petiole, stout, glabrous. Spathe 7 in. long, 4½ in. broad, ascending or spreading, expanded, broadly ovate, acute, cordate at the base with short overlapping lobes. Spadix shortly stipitate, 6 in. long, about ¾ in. thick at the base, cylindrical, slightly tapering. Flowers rather large, about 1½ line in diameter. Ovary ovoid, tapering into a short stout style, which is not exserted beyond the perianth; cells 1-ovulate.

Yungas. (*Nos. 2312* and *2583.*)

This fine species is more nearly allied to *A. ornatum* Schott, than to any other at present described; it differs from that plant in having the sinus of the leaf enclosed by the overlapping basal lobes, and by the much broader spathe which has overlapping basal auricles, whilst in *A. ornatum*, the spathe is decurrent at the base.

ANTHURIUM sp., almost certainly undescribed, but better specimens are necessary. (*No. 2581.*)

ANTHURIUM sp. nov. (?) near *A. Bredemeyeri* Schott. (Specimen without number.)

EQUISETACEAE

EQUISETUM BOGOTENSE H.B.K. Nov. Gen. 1: 42. (*Nos. 1814* and *2923.*)

EQUISETUM GIGANTEUM L. Syst. ed 10. 1318. (*No. 1901.*)

LYCOPODIACEAE

LYCOPODIUM CLAVATUM L. Sp. Pl. 1101. (*No. 1844.*)

LYCOPODIUM REFLEXUM Lam. (*No. 2926.*)

FILICES

(Communicated by Mr. B. D. Gilbert)

? GLEICHENIA CRYPTOCARPA Hook. Determined in the absence of fruit. (*No. 2924*, in part.)

GLEICHENIA MATHEWSII Hook. Fragments of this species, to be distinguished by the squamose stem, were mixed with the last.

? CYATHEA FURFURACEA Baker. "Seven meters high; in forest shade." Coripata, June, 1894. (*No. 2318.*)

ALSOPHILA ARMATA (Sw.) Presl. (*No. 2429*, but perhaps distributed as *2829.*)

ALSOPHILA PRUINATA Kaulf. "Wet mould, in forest." Coripata, May 18, 1894 (*No. 2200*); without locality or data (*No. 1848*).

DICKSONIA DISSECTA Sw. "In wet mould, forest shade." Coroico, September 17, 1894. (*No. 2423.*)

TRICHOMANES KAULFUSSII H. & G. (*No. 2604.*)

ADIANTUM FRUCTUOSUM Kunze. (*No. 2284.*)

ADIANTUM EMARGINATUM Bory. (*No. 1771.*)

ADIANTUM WAGNERI Mett. "In damp shady soil. Local name 'Vacci–vacci,' and used as an emetic." Coripata, February 26, 1894. (*No. 2064.*)

ADIANTUM DIGITATUM Presl. (*No. 1779.*)

ADIANTUM sp. Specimens without fruit. (*No. 2924*, in part.)

PTERIS PODOPHYLLA Sw. "In wet mould, forest shade, scarce, Trunk short, and petioles very long." Sacramento, Yungas, August 14, 1894. (*No. 2384.*)

PTERIS (*Litobrochia*) INCISA Thunb. Near the form called *P. sinuata* Brack. (*No. 2253.*)

LOMARIA ACUTA Desv. The fertile frond only seen. (*No. 2593.*)

LOMARIA FÉEI Jenman. "In mould, forest shade." Coripata, June, 1894. (*No. 2317.*)

BLECHNUM NIGRO-SQUAMATUM B. D. Gilbert, Bull. Torrey Club **24**: 258. 1897. "In running water." Calapampa, July 4, 1894. (*No. 2314.*)

ASPLENIUM FURCATUM Thunb. "Scarce, in mould, in shade of shrubbery." Coripata, April 19, 1894. (*No. 2138.*)

ASPLENIUM LUNULATUM Sw. "In dry mould, in forest." Coroico, September 3, 1894. (*Nos. 2285* and *2419*, the latter perhaps distributed as *2819*.)

ASPLENIUM AURITUM-RIGIDUM Sw. (*No. 2251*.)

ASPLENIUM STRIATUM L. (*No. 4005*.)

ASPLENIUM HARPEOIDES Kunze. (*No. 2233*.)

ASPLENIUM CICUTARIUM Sw. A barren form, the segments more spathulate than in the fertile form. (*No. 2594*.)

DRYOPTERIS PUBERULA Kuntze. Calapampa, Yungas, July 4, 1894. (*No. 2313*.) Known only from Mexico, heretofore.

DRYOPTERIS CONTERMINA (Desv.) Kuntze. Calapampa, Yungas, July 4, 1894, in wet yellow clay, amidst grass. (*Nos. 2366* and *2321*.)

DRYOPTERIS OLIGOCARPA (H. & B.) Kuntze. (*No. 4011*.)

DRYOPTERIS FILIX-MAS (L.) Schott. (*No. 1784*.)

DRYOPTERIS SALVINI (Baker) Kuntze. (*No. 4007*.)

DRYOPTERIS VILLOSA INAEQUILATERALIS B. D. Gilbert, Bull. Torrey Club **24**: 259. 1897. "Scarce in wet mould, in forest shade." Uchimachi, Yungas, August 22, 1894. (*No. 2394*.)

PHEGOPTERIS RIGIDA Hook. & Gr. "In mould, forest shade." Coripata, June 1894. (*No. 2319*.)

PHEGOPTERIS RIGIDA POLYPHYLLA Hook. (*No. 2275*.)

PHEGOPTERIS RUDIS Mett. "In wet, shaded places." Calapampa, July 4, 1894 (*No. 2315*); and wet clay (*No. 2320*).

POLYPODIUM FRAXINIFOLIUM Jacq. A narrow-leaved form. "In damp mould, forest shade." Coroico, September 1, 1894. (*No. 2402*, perhaps distributed as *2802*.)

POLYPODIUM (*Phymatodes*) PERCUSSUM Cav. (*No. 2206*.)

POLYPODIUM PLUMULA H. & B. *No. 2927*.

POLYPODIUM CATHARINAE L. & F. (*No. 2597*.)

POLYPODIUM PLEBEIUM Schlecht. & Cham. (*Nos. 2592* and *2598*.)

POLYPODIUM SUBSESSILE Baker. (*No. 2603*, in part.)

POLYPODIUM THYSANOLEPIS A.Braun. (*No. 2603*, in part.) See also *Acrostichum cuspidatum* for this number.

POLYPODIUM LORICEUM LATIPES L. & F. In forest shade, Coroico, September, 1894. (*No. 2434*. Also *No. 2207*, without locality or date.)

POLYPODIUM POLYPODIOIDES (L.) Hitchcock. (*No. 4003*.)

POLYPODIUM GLAUCOPHYLLUM Kunze. The "var. a" of Hooker. (*No. 2803*.)

POLYPODIUM (*Phymatodes*) LYCOPODIOIDES L. An unsually broad fronded form, without fruit. A single specimen, without locality or date, included with *no. 437*.

POLYPODIUM PECTINATUM L. A form with nearly truncate base (*No. 2228.*)

POLYPODIUM PHYLLITIDIS L. "In mould, in forest." (*No. 2462.*) Uchimachi, Yungas, on decaying tree-trunks, August 22, 1894. (*No. 2395.*)

POLYPODIUM CRASSIFOLIUM L. "In black mould, in forest." Coroico, September, 1894. (*No. 2447.*) Coripata, April 23, 1894. (*No. 2142.*)

POLYPODIUM ANGUSTIFOLIUM Sw. "On decaying trunks." Coroico, September, 1894. (*Nos 2234* and *2461*, or *2861.*)

NOTHOLAENA FLAVENS Moore. (*No. 2600.*)

CHEILANTHES MATHEWSII Kunze. (*No. 2661.*)

GYMNOGRAMMA FLEXUOSA (H. & B.) Desv. (*No. 2599.*)

? ACROSTICHUM HYBRIDUM Bory. Possibly it is *A. scolopendrifolium* Raddi. Sterile fronds only seen. (*No. 2608.*)

ACROSTICHUM SQUAMIPES Hook. (*No. 1791.*)

ACROSTICHUM CUSPIDATUM Willd. Form with rather narrow fronds. (*No. 2603*, in part.)

ACROSTICHUM TECTUM (H. & B.) Willd. (*No. 2602.*)

ACROSTICHUM MUSCOSUM Sw. (*No. 2601.*)

ACROSTICHUM STRICTUM Raddi. (*No. 4001.*)

ACROSTICHUM LONGIFOLIUM Jacq. (*No. 4000.*)

ACROSTICHUM CERVINUM Sw. Sterile fronds only. (*No. 4002.*)

SCHIZAEA ELEGANS (Vahl) Sw. A small form. (*No. 2925.*)

ANEIMIA PHYLLITIDIS (L.) Sw. "Abundant in gravelly soil." Coripata, March 6, 1894. (*No. 2080.*)

MARATTIA ALATA Sw. "In wet mould, forest shade." Uchimachi, Yungas, August 22, 1894. Trunk short and thick, and petioles very long and fleshy. (*No. 2393.*)

BOTRYCHIUM TERNATUM (Thunb.) Sw.
Form near *B. dissectum*. (*No. 2595.*)

BOTRYCHIUM VIRGINIANUM (L.) Sw. (*No. 2596.*)

Ferns unfit for determination are *nos. 4008*, *4009*, *4010* and *4012*. *No. 1804* is a fern prothallium.

BRYOPHYTA

SPHAGNUM CORYPHAEUM Warnst. (*No. 2928.*) *Fide* C. Warnstorf.

SPHAGNUM MEDIUM Limpr. (*No. 1854.*) *Fide* C. Warnstorf.

Bryum argenteum lanatum (Brid.) Br. & Sch. (*No. 1844.*)
Polytrichum conforme Mitt. (*No. 2931.*)
Polytrichum aristiflorum Mitt. (*No. 2930.*)
Anthoceros laevis L. (*No. 1803.*)

LICHENES

Baeomyces imbricatus Hook. (*Nos. 1846, 1866* and *1915.*)
Cladonia gracilis verticillata Fr. (Specimen without number.)
Cladonia degenerans Floerk. (*No. 1847.*)
Cladonia ceratophylla (Sw.) Eschw. (Specimen without number.)
Cladonia rangiferina (L.) Hoffm. (*No. 1849.*)
Cladonia sphaerulifera (Tayl.) Nyl. (Specimen without number.)
Parmelia americana Mez. & Flot. (*No. 1851.*)
Parmelia boliviana Nyl. (*No. 1853.*)
Usnea barbata hirta Fr. (Specimen without number.)
Usnea laevis (Eschw.) Nyl. (Specimen without number.)
Sticta andensis Nyl. (*No. 1935.*)
Sticta boliviana Nyl. (Specimen without number.)
Stereocaulon myriocarpum Fr. (*No. 1850.*)
Stereocaulon proximum Nyl. (*No. 1852.*)
Stereocaulon macrocarpoides Nyl. (*No. 1856.*)
Stereocaulon ramulosum Ach. (*No. 1785.*)
Alectoria jubata (L.) Ach. (*No. 2046.*)
Physcia galactophylla Tuck. (*No. 1934.*)
Urceolaria cinereo-caesia Sw. (*No. 1855.*)
Ramalina laevigata Fr. (*No. 1937.*)
Ramalina calicaris canaliculata Fr. (Specimen without number.)
Leprocaulon arbuscula Nyl. (Specimen without number.)

FUNGI

Hypoxylon annulatum Fr. "Growing on old stems." Calapampa, July 4, 1894. (*No. 2310.*)
Favolus brasiliensis Fr. (*No. 1951.*)
Mitrula sp. Specimens immature. (*No. 1867.*)

(The following are galls: *Nos. 2101, 2102, 2103, 2104, 2105, 2109.*)

A Peculiar Group of Solanaceae.

Since the printing of the preceding signatures, I have learned that Mr. Bang's *no. 1210* was a mixture of two species. One of these is said by Dammer (Bot. Jahrb. **37**: 639. 1906) to be *Brachistus tetrandrus* (Br. & Bouché) B. & H., a plant that I do not know. The other agrees exactly with the figure of Ruiz & Pavon of their *Solanum anceps*. It is the same as *Rusby 766* and *Bang 2513* and *2526*. This species I transferred (Bull. Torrey Club **26**: 197) to the genus *Bassovia*. No one with a modern knowledge of the genera of *Solaninae* could regard this plant as a *Solanum*. In general habit, anthotaxy, calyx, corolla and fruit, it is a perfect *Bassovia*. Its stamens show a partial tendency to be separate as in *Bassovia*, but they end in pores, and these pores are exceptionally large and conspicuous, and of peculiar appearance, and are continued into sutures, as in *Cyphomandra*. The anthers, moreover, are somewhat enlarged upward. These characters would exclude the plant from every genus except *Solanum* and *Cyphomandra*, and the latter is outside of consideration here.

On page 420 of this paper, I have described "*Solanum* (?) *bassoviicarpum*," and have said that I placed it in *Solanum* with reluctance. A comparison shows it to have exactly the same anther-characters as those of *S. anceps*.

In Bull. Torrey Club **26**: 194, I have described "*S. psidiifolium*." When Dr. Britton first received this plant, he called it "*Bassovia Rusbyi*" (MS.), but I could not admit it to that genus, because of its anther-characters, now seen to be the same as those of the plants above discussed. My "*S. Lindenii*" (Mem. Torrey Club **6**: 88) is so close to the last-named that it may be only a variety of it. My "*S. clavatum*" (*l. c.* 87) has the same anthers, as has "*S. brevipedunculatum*" (*ante*, page 421). There are other peculiarities in which all the plants above named agree. They have scorpioid pseudo-racemes, the rachis nodose with the pedicel-bases of the fallen flowers. However different the foliage of the species, there is also a similarity, indescribable perhaps, but bespeaking relationship. There is a very strong similarity between these plants and the genus *Bassovia*, and one is inclined to regard them as forming a section of that genus, but the striking anther-characters appear to forbid this course. The other course is to regard them as forming a distinct genus. This is probably what I

shall do, but the subject requires more study than I can bestow upon it before publishing this paper.

The puzzling and contradictory characters of the *Bassovia–Brachistus* group have led me into other errors, and I must now make the following admissions:

Bassovia Fendleri Rusby (Bull. Torrey Club **26**: 197) is **Brachistus Fendleri**. *Bassovia inaequilatera* Rusby (Mem. Torrey Club **6**: 90), as to *Bang 1708*, but probably not *Rusby 765*, is **Brachistus inaequilaterus**.

In the genus MICONIA, in the present paper, are several unfortunate typographical errors in the citation of collection-numbers. These should be corrected as follows:

Page 357. M. CORDATA. (*Nos. 1995* and *2186.*)
M. GLOMULIFERA. (*No. 2856.*)
Page 358. M. GRANULOSA. (*No. 2485.*)
M. MACROPHYLLA. (*No. 2670.*)
M. MINUTIFLORA. (*No. 2213.*)
Page 359. M. THEAEZANS SUBTRIPLINERVIA. (*No. 2299.*)

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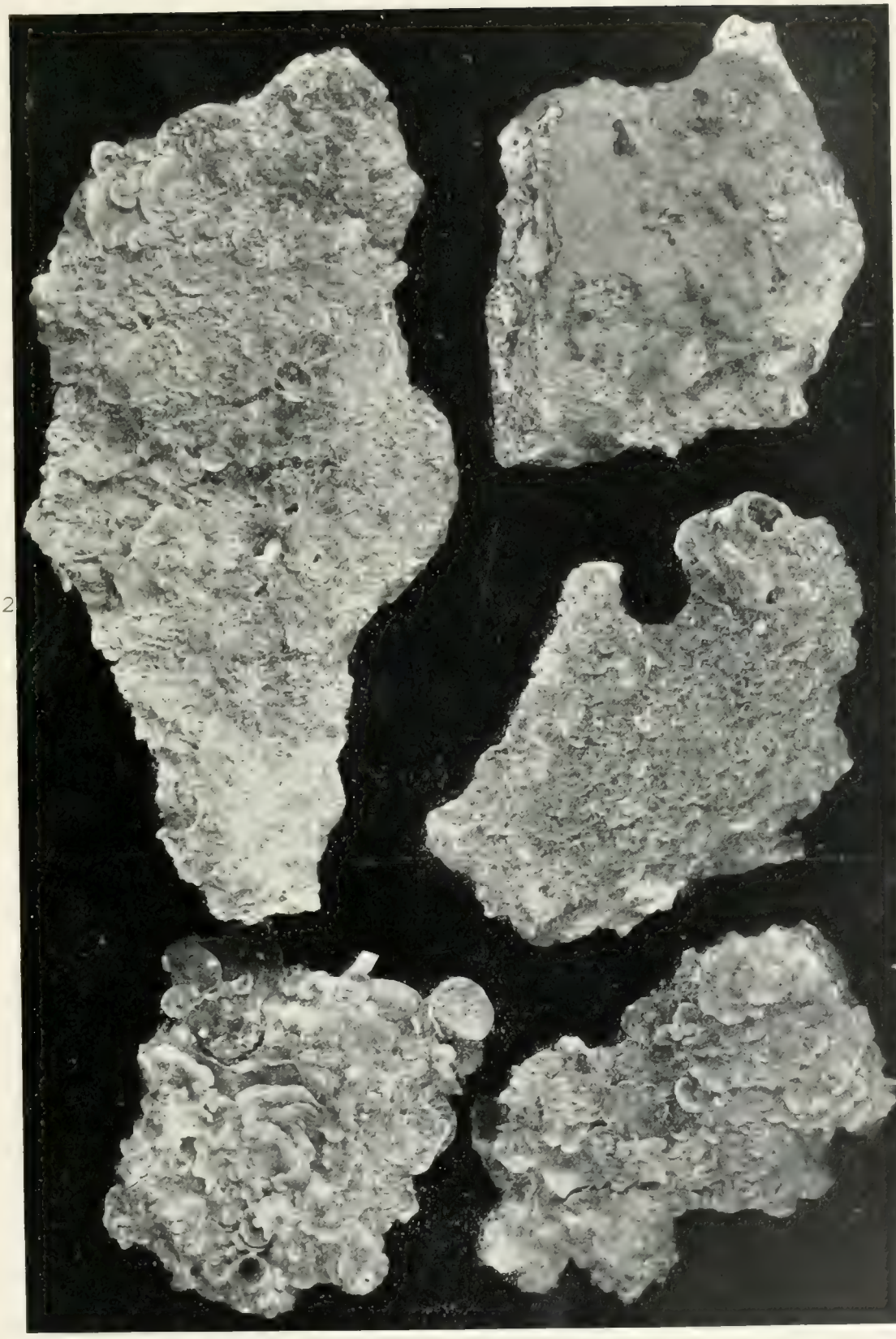

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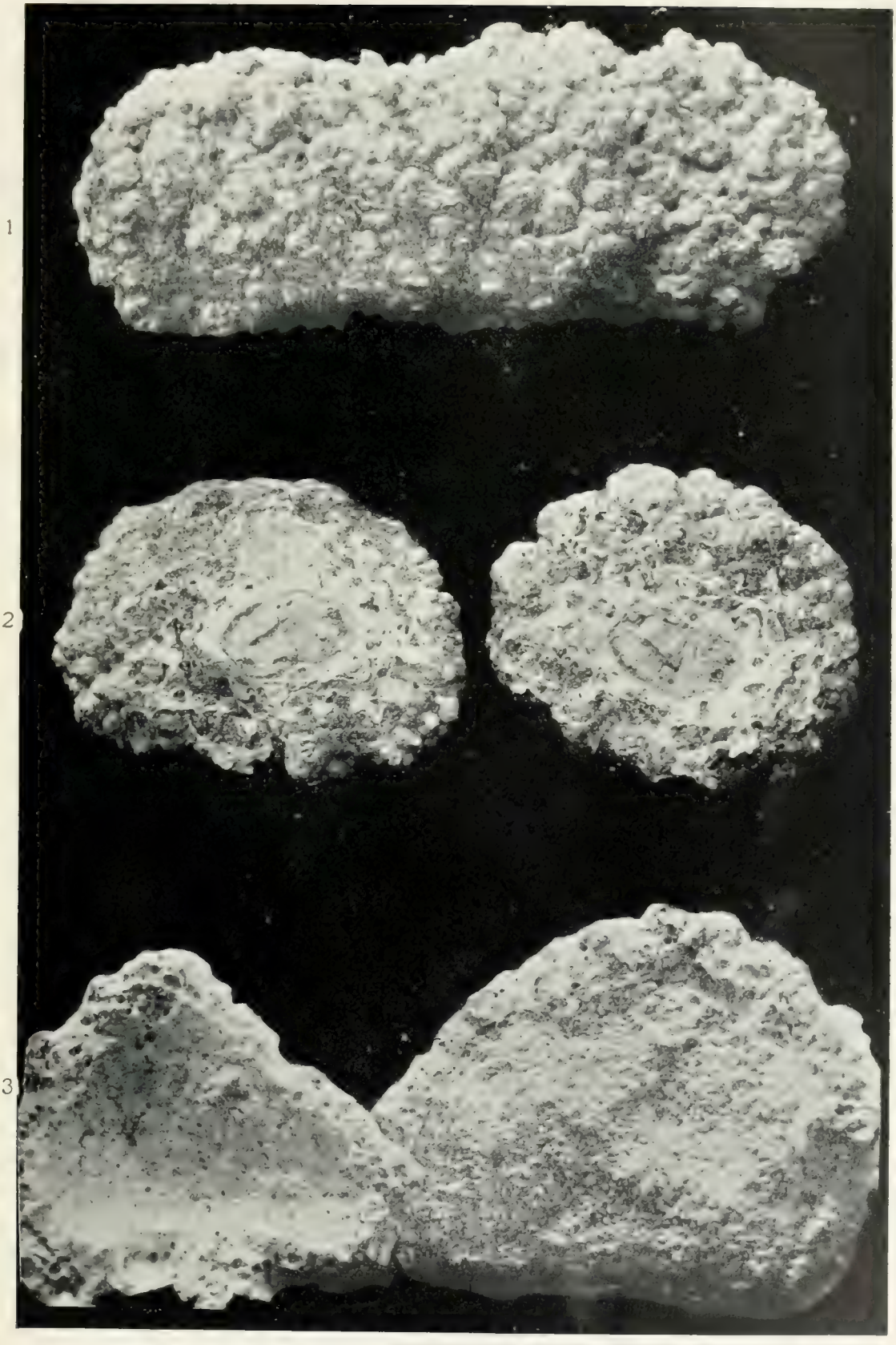

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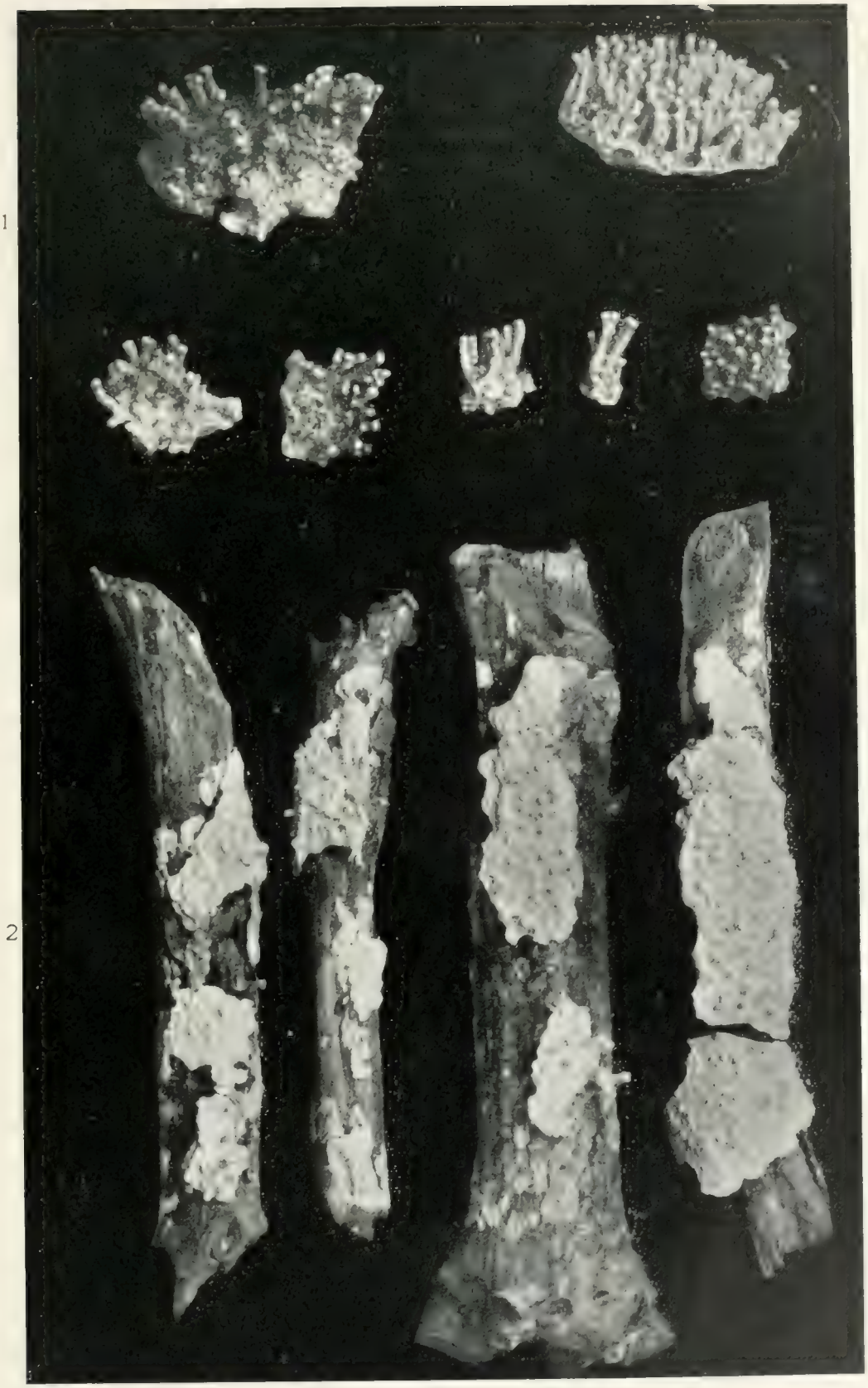

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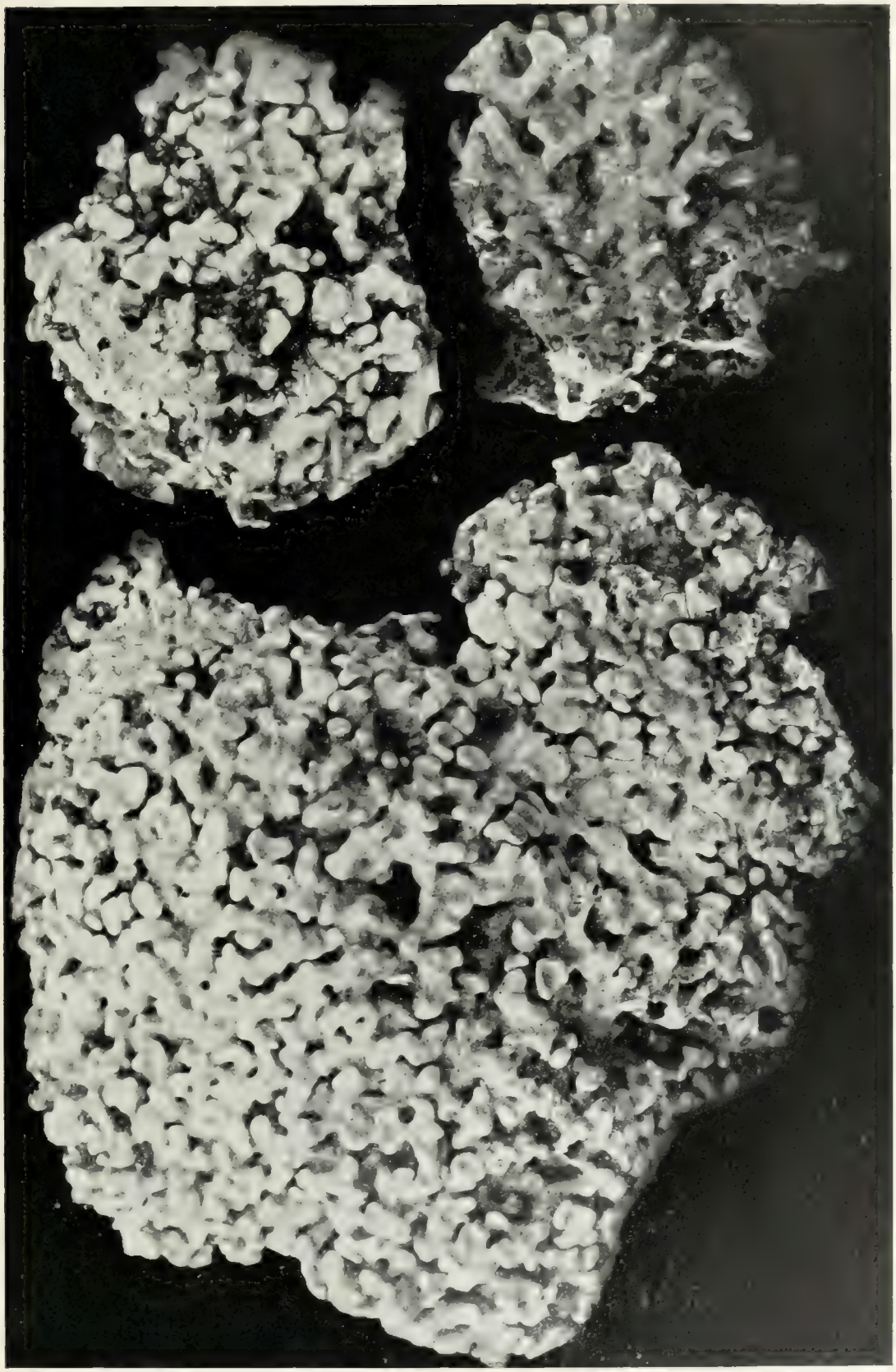

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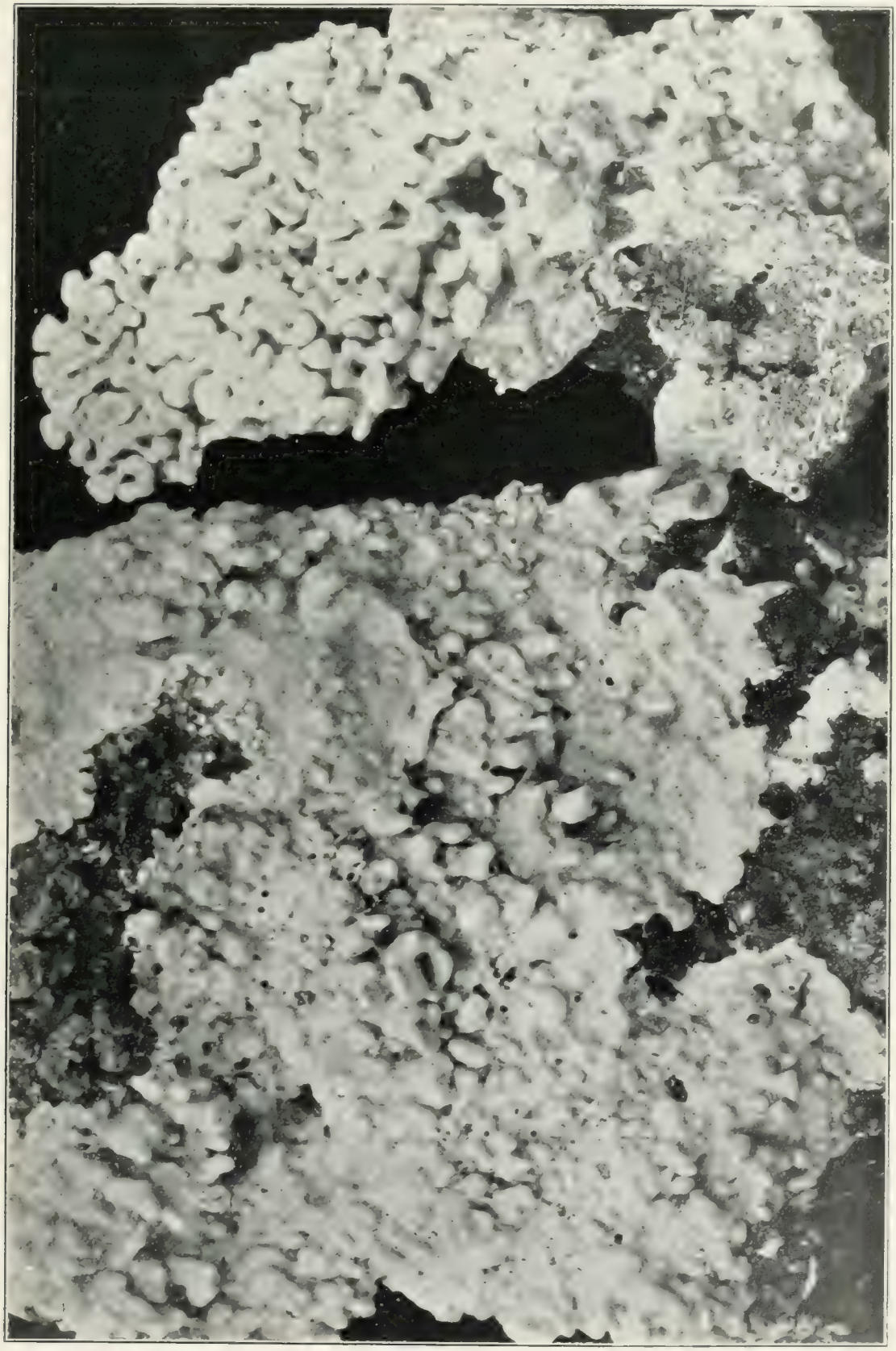

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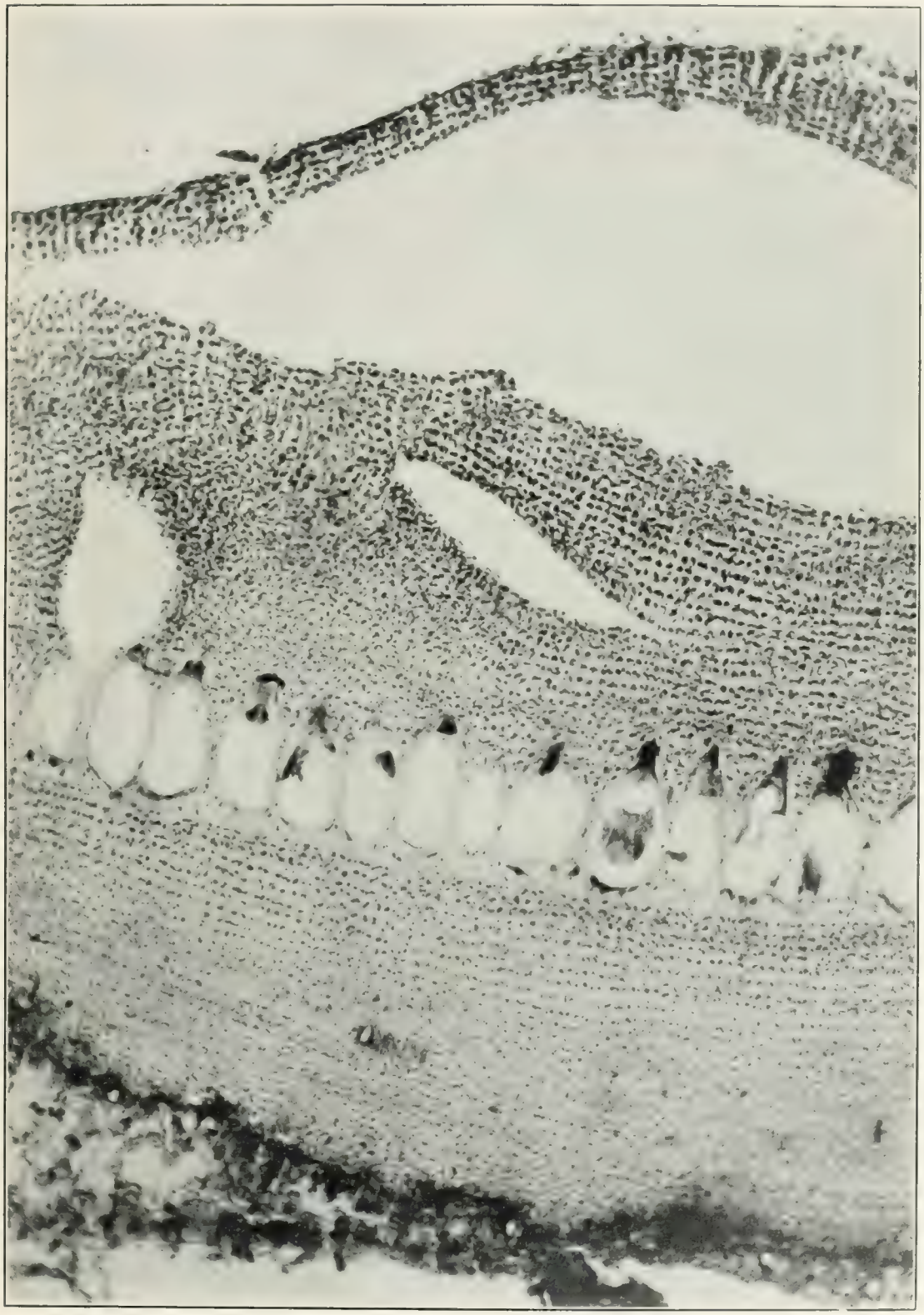

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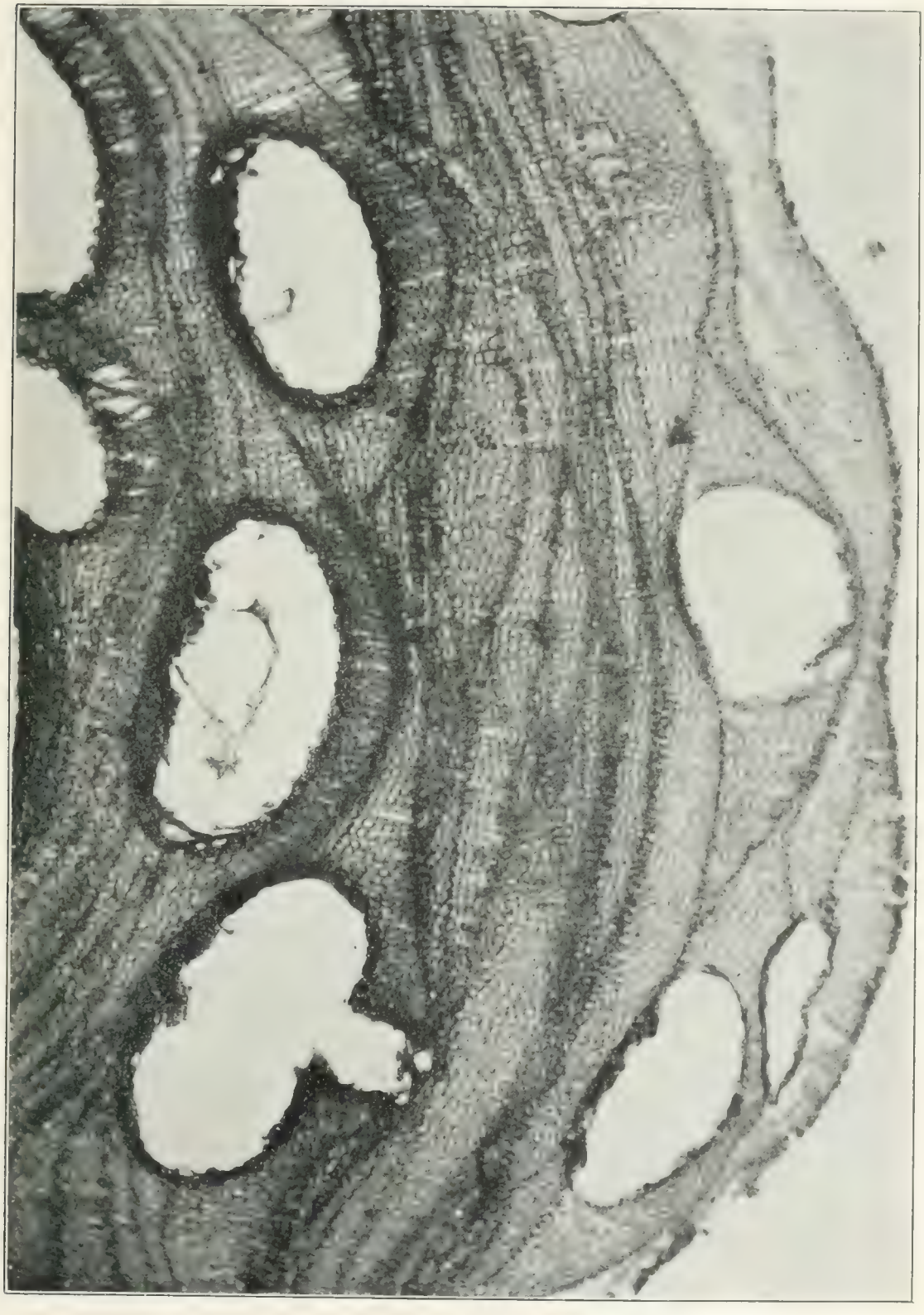

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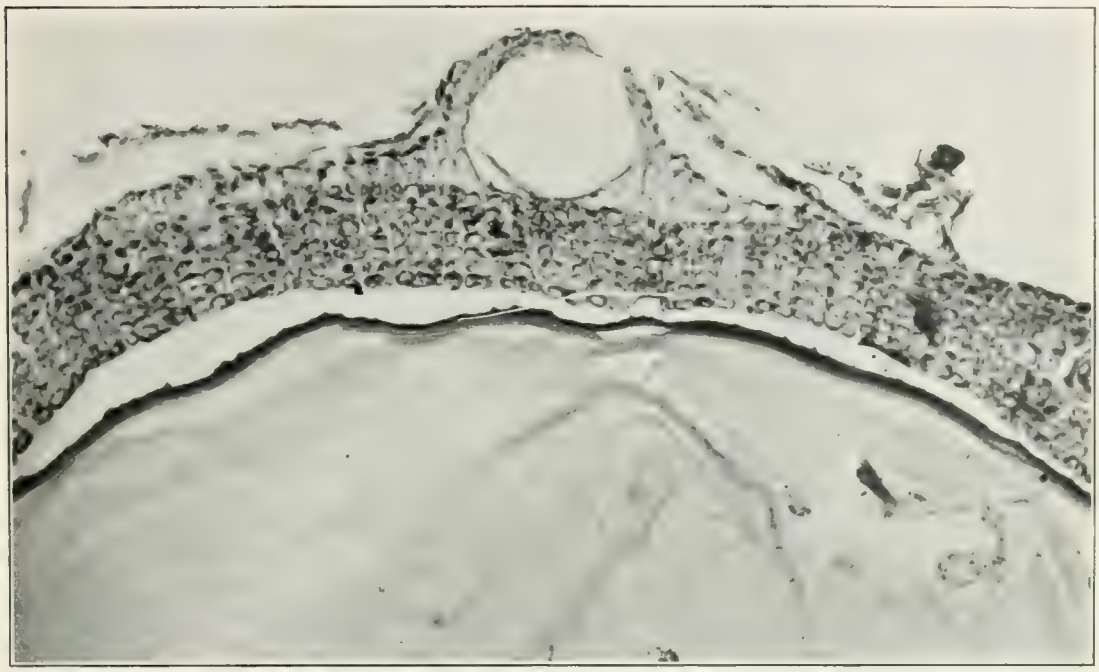

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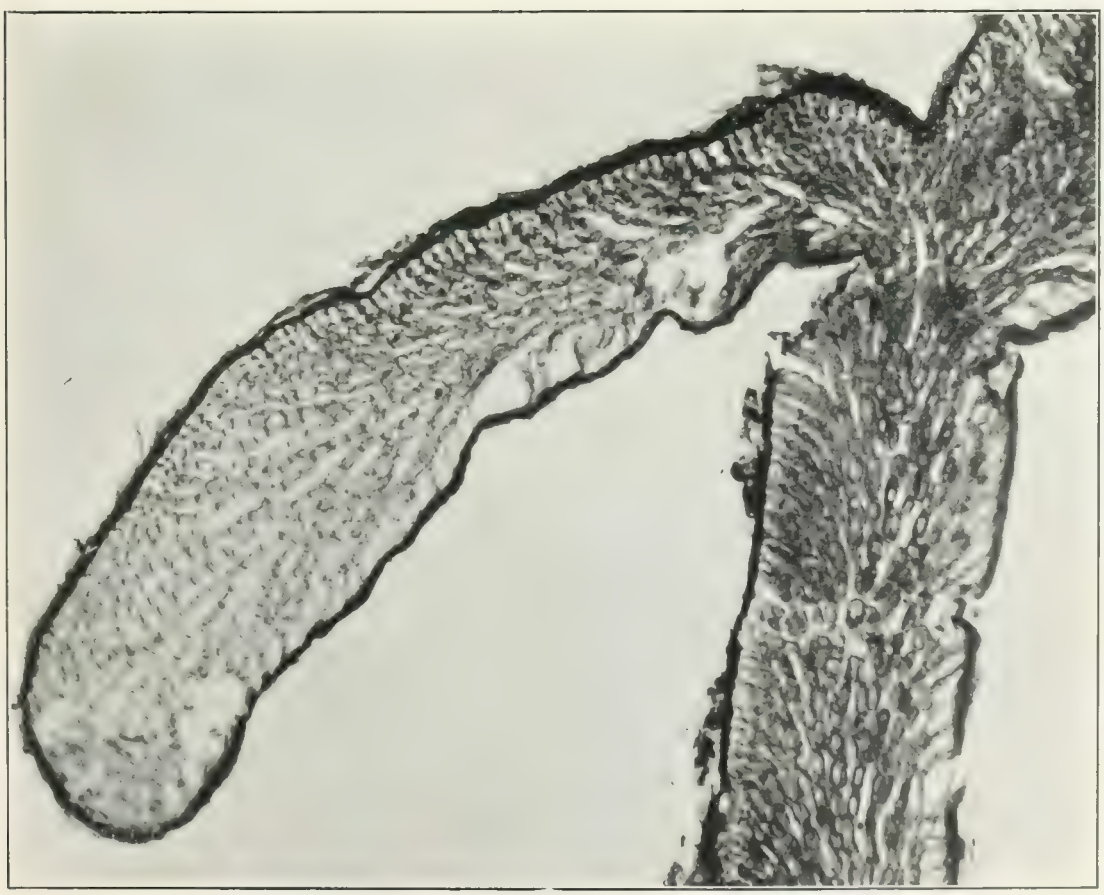

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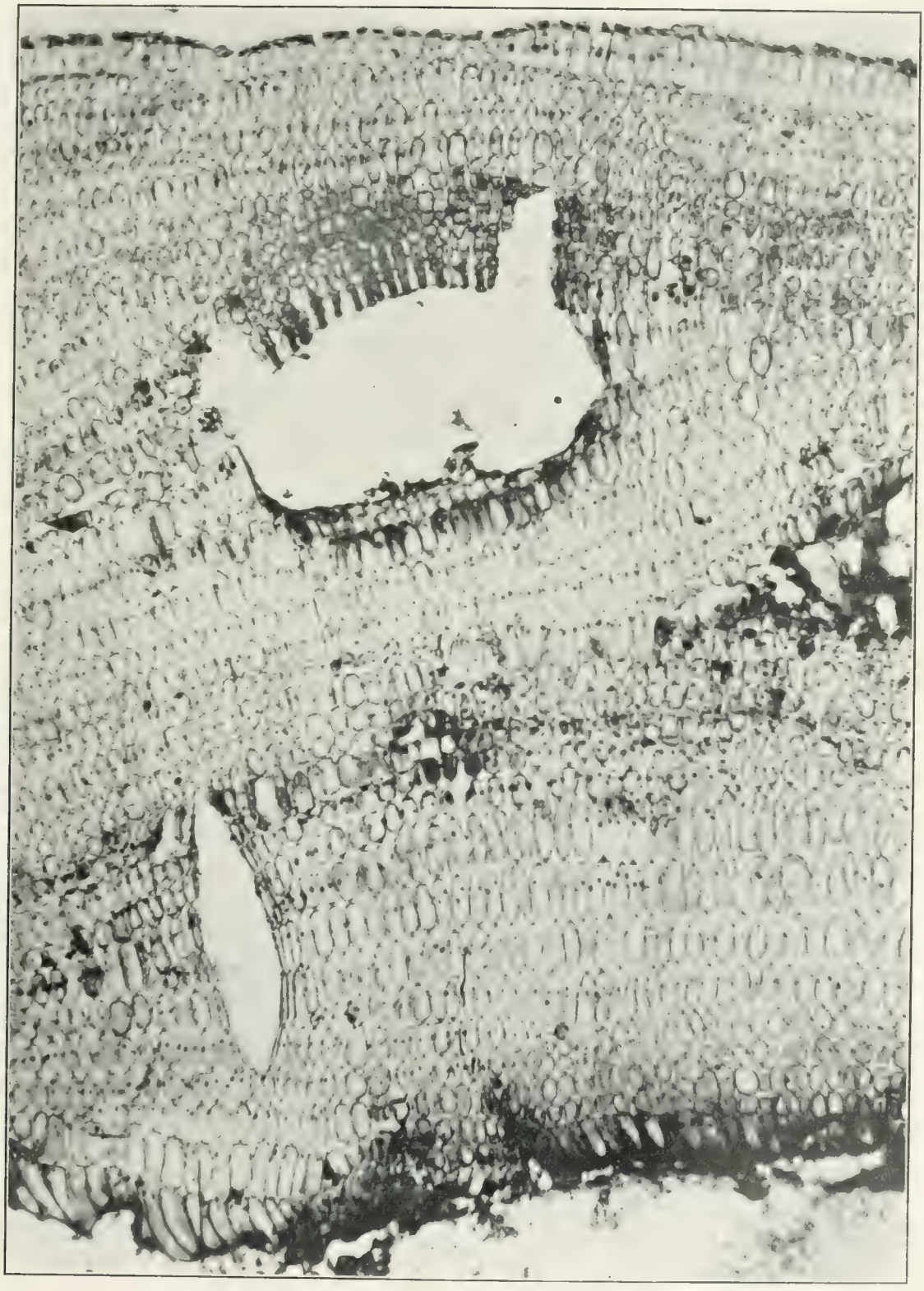

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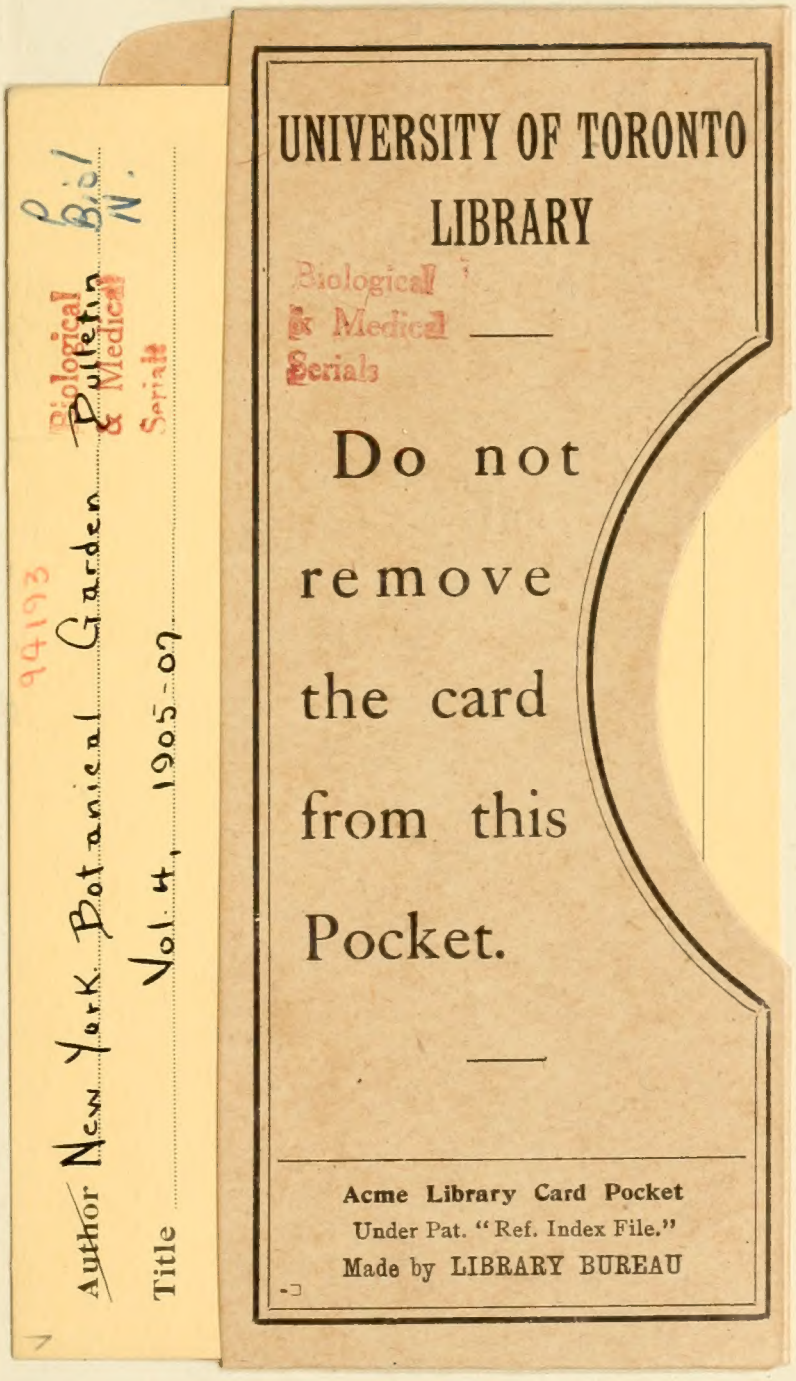

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